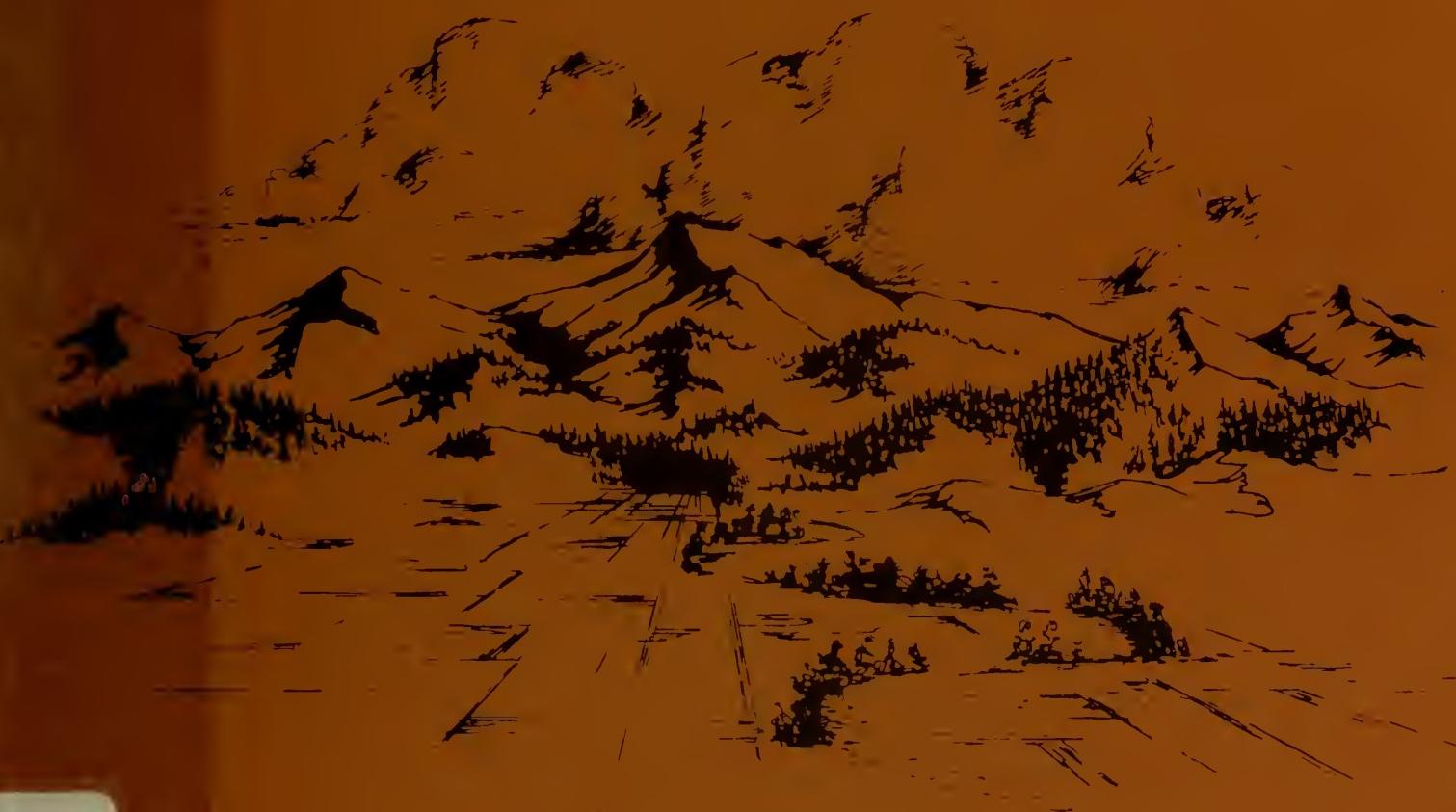




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# The Proposed Ladron Mountain Primitive Area: A Resource Analysis

By: Thomas Manthey  
New Mexico Bureau of Land Management  
— Socorro District Office



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THE PROPOSED LADRON MOUNTAIN  
PRIMITIVE AREA: A RESOURCE ANALYSIS

by

G. Thomas Manthey

Sponsored by the Bureau of Land Management  
Socorro District Office  
Socorro, New Mexico

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David Kathman - San Augustine Area Manager  
Jerry Townsend - Chief of Resources

June, 1976



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## ABSTRACT

Ladron Mountain, located in central New Mexico, remains biologically unique, separated from the neighboring mountain ranges. Its geographical position coincides with the convergence of several major floristic influences. The mountain's small geographical size, abrupt rise from the surrounding plains, and isolation from other mountain ranges create, in effect, a mountain island.

Pre-Cambrian granite and Missisipian limestone comprise a large bulk of the mountain. The thin soils derived from them occur mostly in the bottoms of arroyos and washes. The dry, warm climate combines with the thin soil and lack of water to support upper Sonoran life zone species with Transitional life zone species occurring only in a few protected areas. The lack of water seems to be the one factor that most strongly influences the flora and fauna of Ladron Mountain. Two B.L.M. installed water catchments and one improved spring are the only improved water sources.

Sierra Ladrones (the Thieves' Mountain) is derived from the bandits who found it an ideal refuge. The mountain's position near the Rio Grande and Rio Salado offered the bandits excellent access to travelers along those routes. In the past, goat and sheep grazing, scale mining, and prospecting in adjacent areas were the major economic uses of the mountain. Since the 1950's cattle have replaced the sheep and goats.

The Primitive Area has little economic potential at the present, other than livestock grazing. The land is not irrigable

for agriculture and there are no possibilities of timber harvest. At the present time there is no mineral production, with none foreseen in the future.

The area is well supplied with access roads, many of which are passable only to 4-wheel drive vehicles and pickup trucks. For this reason, future recreational use in the area by passenger cars should be discouraged.

An evaluation of the material obtained for this Unit Resource Analysis appears to correlate with the B.L.M.'s requirements for Primitive Area designation.

# VICINITY MAP

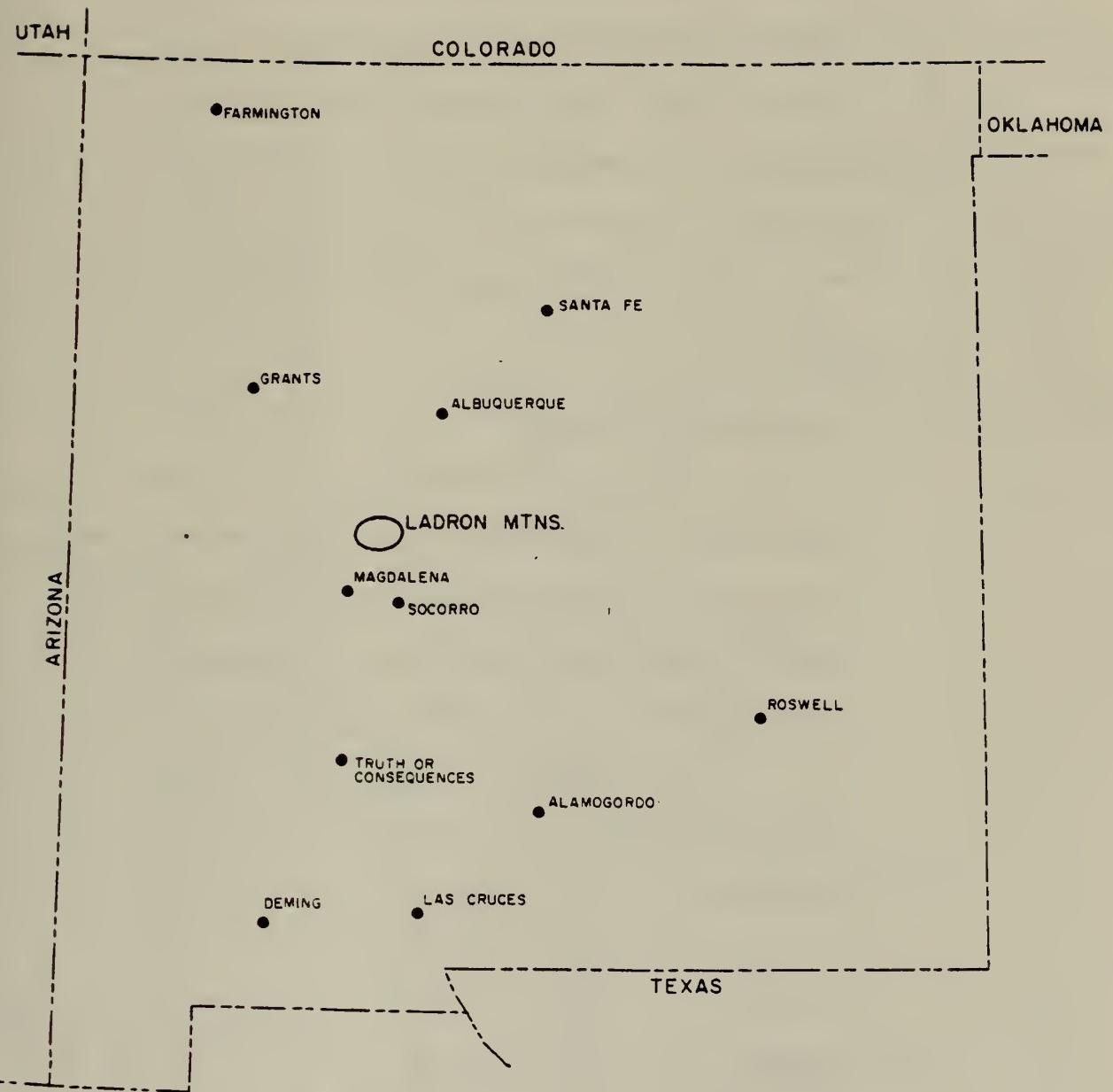


Figure No. 1

## II. DESCRIPTION OF THE PROPOSAL

### A. Description of the Project

To preserve and protect the natural values of Ladron Mountain, the Bureau of Land Management has proposed designating approximately 18,000 acres of land as primitive area. If established as a primitive area, Ladron Mountain would be managed by the Bureau of Land Management in compliance with Part 6220- of Title 43-Public Lands: Interior, in the Code of Federal Regulations.

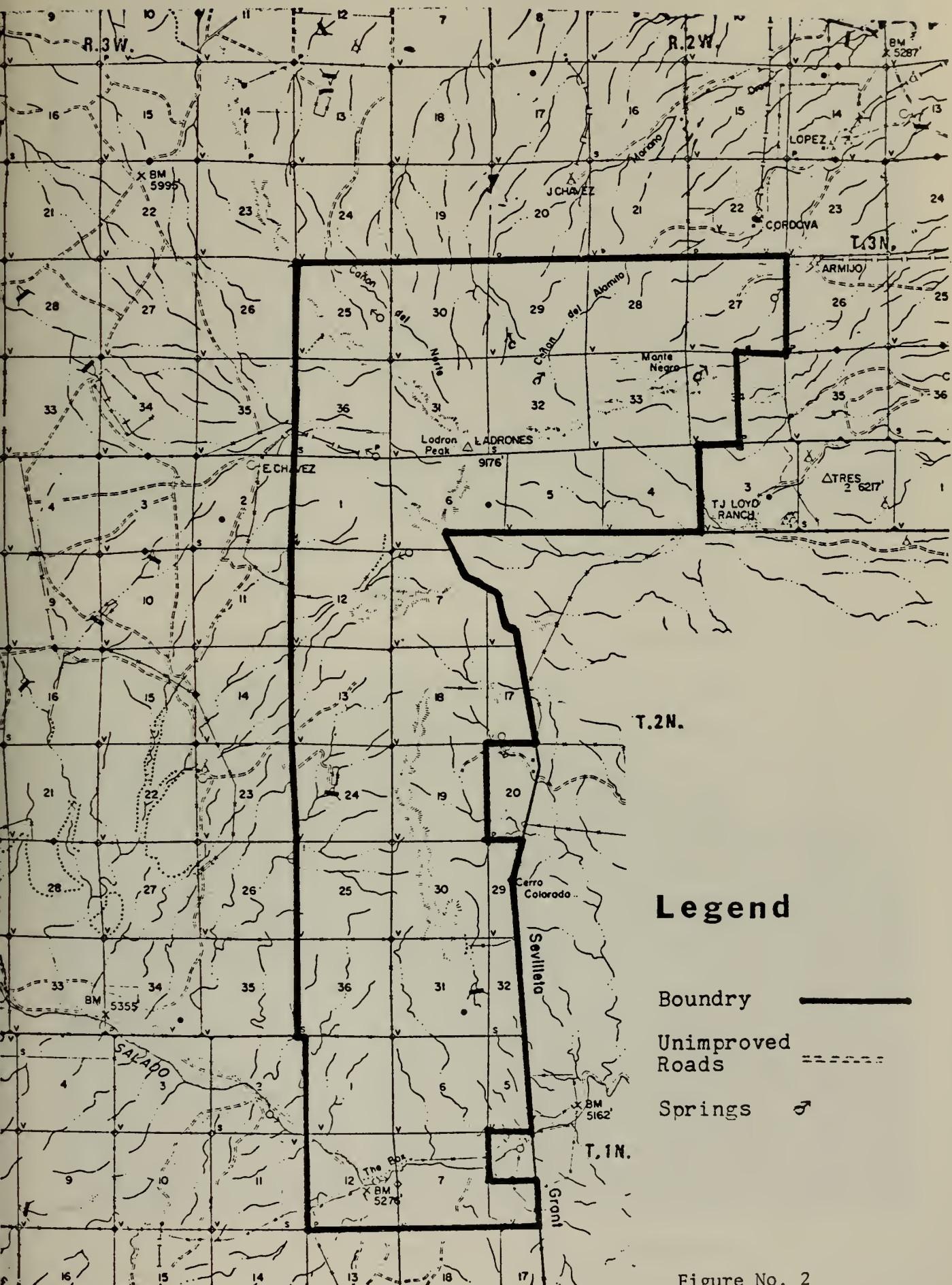
### B. Purpose of the Project

For qualification as a primitive area, criteria in subpart 6221.1, from the above regulations must be met. This present study, A RESOURCE ANALYSIS OF THE LADRON MOUNTAIN PRIMITIVE AREA, is the first step in the process of designation. It is designed to provide:

A. a comprehensive analysis of inventory data, resource problems, conditions, uses, production, quality, capabilities, and management potential, for use in preparing the management framework plan.

B. summarized data resource information pertinent to making land-use decisions on a unit, and for use in all other phases of resource management, including public contact.

# Proposed Boundary



## Legend

- Boundary —————
- Unimproved Roads - - - - -
- Springs ♂

Figure No. 2

C. a means of achieving continuity in resource data retention and maintenance.

C. Description of the Area

Ladron Mountain proposal area is located in the Ladron Planning Unit (2-06) of the San Augustine Resource Area, Socorro District. It is a prominent landmark from all directions for many miles. The range, north-south trending, and approximately 10 miles long and 8 miles wide, is surrounded by plains on three sides, which slope towards the Rio Grande Valley to the east, and the Rio Salado to the south. Ladron Mountain is included in the Basin and Range Province Mexican Highlands of the Inter-Montane Plateaus. The bulk of the mountain is composed of Pre-Cambrian rocks.\* Ladron Peak, at 9,176 feet rises approximately 3,675 feet above the surrounding grassland at 5,500 feet, with the majority of its peaks above 7,000 feet. The proposed primitive area is 18,304.44 acres, 16,153.64 of which is BLM land (See Figure 2). The majority of this land includes the upper portion of the mountain (6200-9176 feet). The proposed area is bounded on three sides by BLM grazing allotments leased to local ranchers and on the fourth side by the Sevilleta Wildlife Refuge.

\* U. S. Geological Survey. 1965, Mineral and Water Resources of New Mexico, New Mexico Bureau of Minerals and Mineral Resources Bullet. No. 87

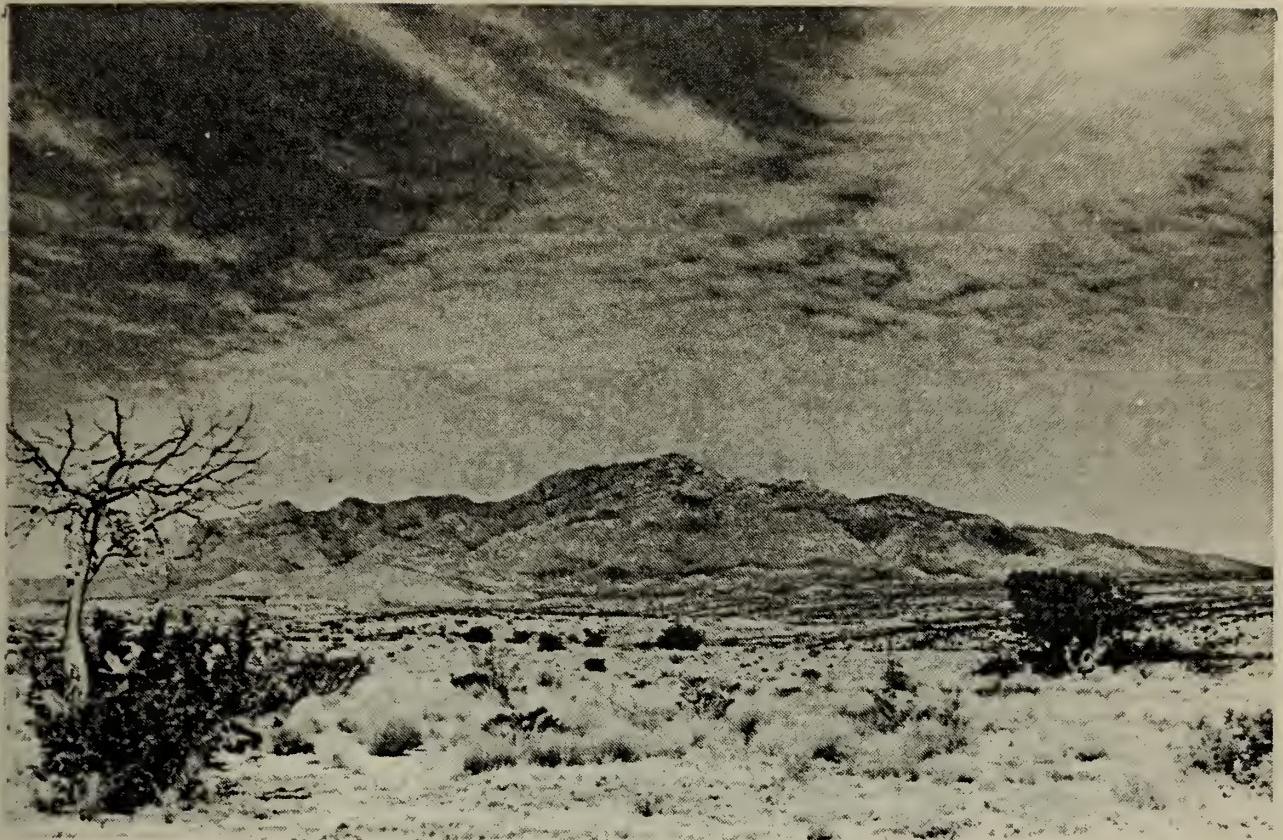


PHOTO 1 : Distant View of Ladron Mountain



PHOTO 2 : Rugged Topography of Ladron Mountain

Ladron Mountain lies principally within the upper Sonoran Life Zone, with its tallest peaks, ridges, and favored small pockets in the Transitional Life Zone.

D. History of the Area

Sierra Ladrones translated from Spanish means literally "the Thieves' Mountain". Ladron's rugged terrain lent itself well to the first use it received. The mountain is reported to have been a sanctuary in the 17th and 18th centuries for robbers and horse thieves. It is believed to this day, by some, that a hidden treasure still exists on the mountain. It served as an ideal lookout and retreat for the robbers who preyed on travelers using the Camino Real, a historic trail paralleling the Rio Grande, while extending from Santa Fe to Chihuahua, Mexico.

During the Civil War, Confederate Colonel Sibley, while retreating with a small number of his men from a defeat at Glorieta Pass, New Mexico, buried several cannons along the south bank of the Rio Salado, at its confluence with La Jencia Creek. One of these cannons was found in recent years. At that time it spurred interest in other artifacts that might be there, but nothing more was recovered. Several markers, believed to be soldiers graves have also been located in this area. These markers have not been confirmed as graves, however.

An old wooden trunk containing a leather bound Spanish bible was found on the mountain. It is believed to have belonged to an early Spanish missionary, Fray Diego Jimenez, who worked in northern Mexico between 1632 and 1678. As story has it, he disappeared and was never found. It is possible that he was killed by Indians or robbers who inhabited the mountain at the time.

During the 1940's and 1950's an old hermit would make Ladron his home for a short time as he wandered around the Magdalena, Socorro, Ladron Area. The man was reported to be very much of a recluse, but oldtimers report running into him on occasion.

During the forties quite a large number of goats were grazed on the mountain. The decline in the price of wool and mohair in the 1940's and the difficulty of predator control were the major causes for the shift from goats and sheep to cattle. Old campsites and corrals can still be seen on the upper portions of the mountains.

Since the 1950's cattle production with some very limited mining activity have been the major uses of this area.

### III. DESCRIPTION OF THE EXISTING ENVIRONMENT

#### A. Nonliving

1. Air (Climate) - The climate of Ladron Mountain is characteristic of south-western desert mountains. The relative humidity is consistent throughout the year, with annual average of less than 45% recorded at the Socorro weather station. Normally there are 189 frost free days (mid-April to late October), a mean maximum temperature of 101.3 F°, and a mean minimum of -7.4 F°. Summer temperatures are warm, with a maximum temperature averaging above 90 F° from June through August. The average daily temperature range exceeds 30 degrees because of the considerable cooling that occurs at night. Winter temperatures on the mountain are characterized by cool daytime temperatures and cold nights. From mid-November to mid-March temperatures typically fall well below freezing and occasionally below zero.<sup>1</sup> Temperatures average 2 to 3 degrees lower for each 1,000 feet increase in elevation.

No precise precipitation data is available for Ladron Mountain.<sup>2</sup> The estimated annual precipitation on the upper portion of the mountain is 14-16 inches.

1. See Figure No. 3
2. See Figure 4-5

MONTHLY TEMPERATURE FOR BERNARDO, 1963-1974

(Average & Extremes)

(Bernardo 1963-1974)

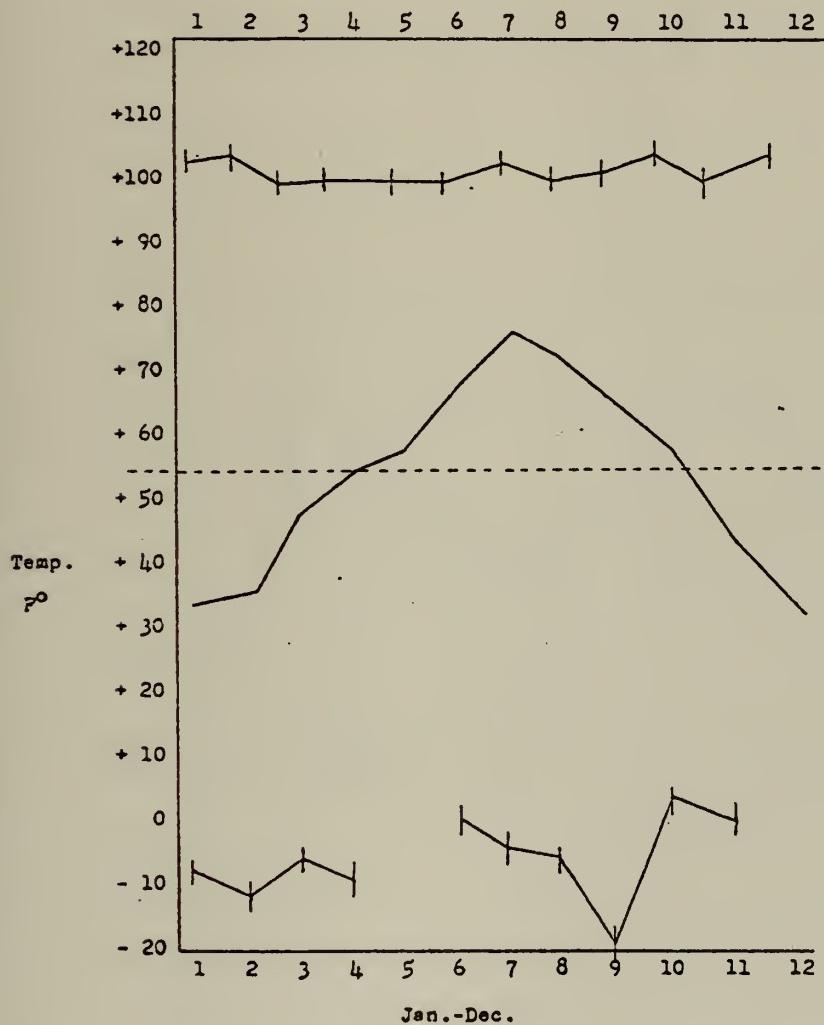
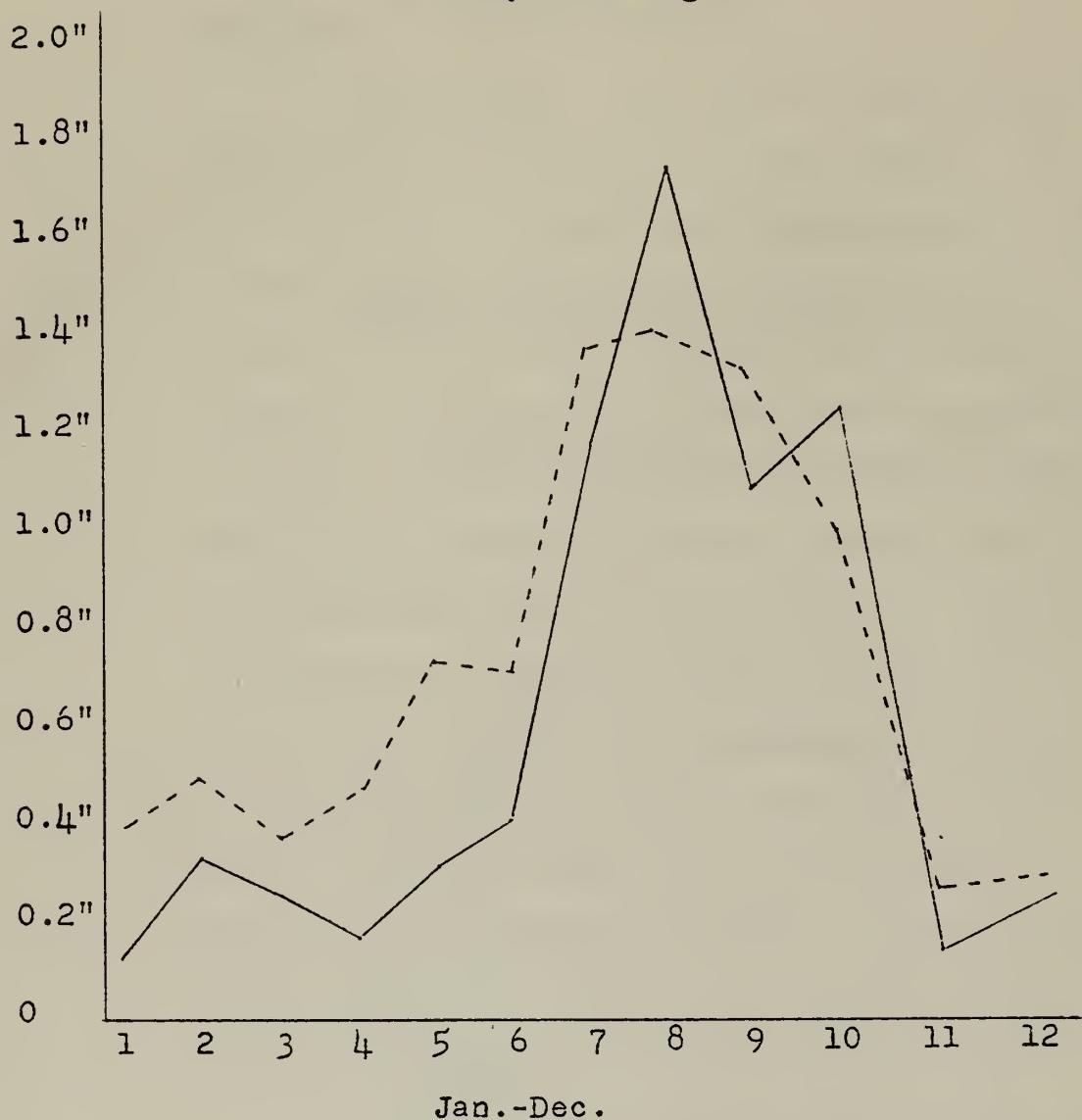


Figure No. 3

PRECIPITATION FOR BERNARDO & SOCORRO, 1964-1974

(Monthly Precipitation)  
(10 yr. average)



LEGEND

Bernardo —————  
Socorro -----

Figure No. 4

PRECIPITATION FOR BERNARDO & SOCORRO, 1964-1974

(Total Annual Average Precipitation)

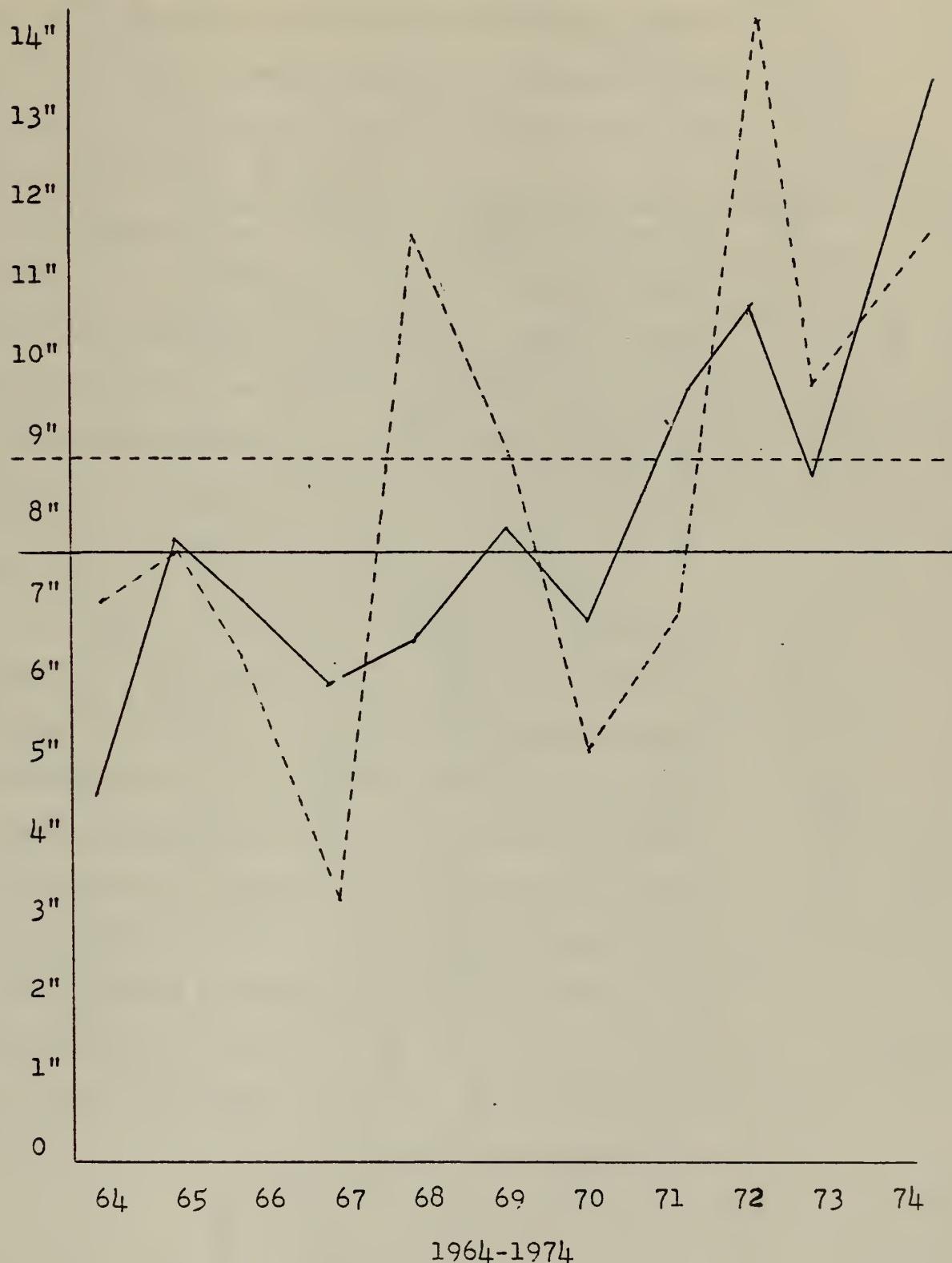
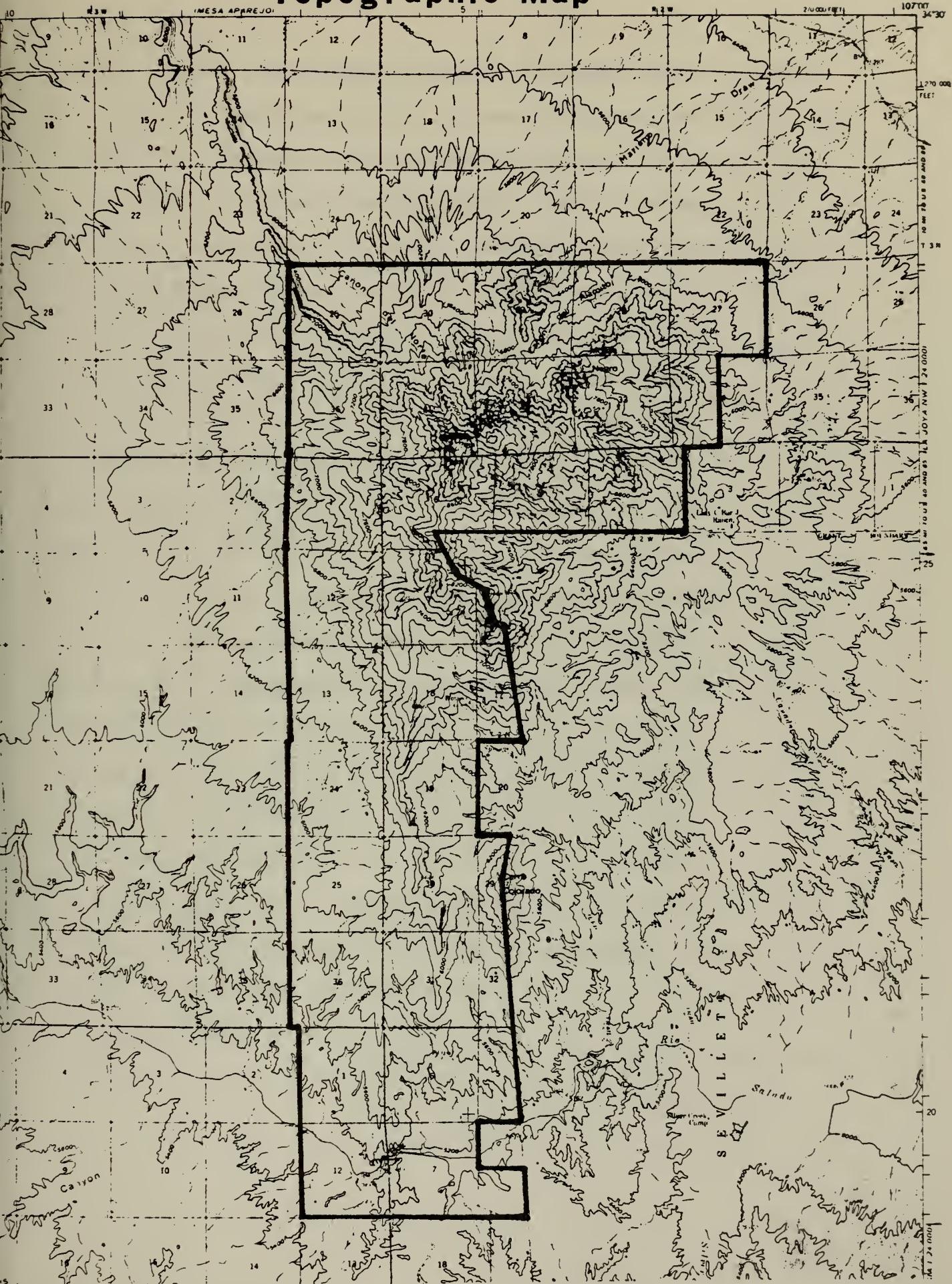


Figure No. 5

Approximately one-half of the yearly precipitation on the mountain occurs during brief afternoon thunderstorms from July to September. Although winters are relatively dry, most of the precipitation is in the form of snow. The moisture laden storms tend to follow the predominant wind patterns. During the spring and summer the winds tend toward southeasterly, while during the fall and winter they tend to be from the southwest. During March and May, and August and September, there may be occasional windy days with blowing dust. It must be noted that local surface wind directions will vary greatly because of the topography.

2. Topography - Ladron Mountain rises abruptly from surroundings of relatively low relief and exists as a discrete range independent of nearby ranges. Its ruggedness and height is accented by its isolation and limited geographical size. The abrupt rise is most noticeable on the north and east aspects where the adjoining pediments and alluvial fans are nearly 3,000 feet lower than the highest ridges. (See Figure 6) The northern end of the mountain ends abruptly with precipitous granite cliffs. Steep foothills extend down to the surrounding plateau. The eastern side is traced with several small canyons that end among the rolling foothills.

# Topographic Map



These canyons are filled with many boulders almost to the base, giving the eastern side the appearance of piles of rocks. The rise in altitude is more gradual on the south and west sides. A thick section of upturned limestone buttresses the western side of the range. This gives way on the upper 1/3 of the mountain to steep sloped ravines and rocky cliffs. This limestone is eroded away to the east forming a prominent hogback which decreases in elevation from approximately 7,500 feet, just west of the peak, to 5,400 feet at the Rio Salado. West of the hogback the land slopes gently to an elevation of about 6,000 feet to meet the surrounding plains. To the east the land remains rugged with highly dissected, steep-sided, hills that eventually grade into the Rio Grande plateau.

Because of the steepness of the slopes, cattle grazing on the mountain is limited to the lower slopes and some of the major canyons that enter the mountain. For the above reason rather large goat and sheep herds existed on the mountain in the early 1940's. At one point its normally wide sandy bed is restricted as it cuts through part of the Pennsylvanian Limestone Formation to form "The Box". The walls of the canyon rise nearly one hundred feet above the river bed. Water marks indicate that during summer rains the flow may be so restricted as to cause the river to rise 30-40 feet above its bed.

### 3. General Geology - Rocks in the Sierra Ladrones

consist principally of Pre-Cambrian metasediments and two separately mapped granitic units. West of Ladron Peak are carboniferous sediments, mainly limestones, sandstones, and shales. Scattered outcrops of Pennsylvanian sediments also occur east of Cerro, Colorado.

Quaternary pediment gravels are abundant along the south and southeast flanks of Cerro, Colorado and to the east of it. At least two pediment surfaces can be recognized. Quaternary alluvium is found in all valleys and canyons.

The early Pre-Cambrian metaquartzites form Ladron Peak and a high steep ridge (main ridge) which extends approximately 3 miles south to southeast from the peak.

Red granitic-gneiss and feldsparthic quartzites are well exposed on Cerro, Colorado, about 5 miles south of Ladron Peak.

West of Cerro, Colorado a hogback of carboniferous sediments extends north-south along the entire west side of the Sierra Ladrones.

The southeastern part of the area is covered by the Tertiary Popotosa formation, a volcanic conglomerate which contains boulders as large as 2 feet across.

Quaternary pediment gravels, consisting mainly of Pre-Cambrian and to a lesser extent of carboniferous rock fragments, are abundant in the southeastern and east-central parts of the area. Alluvium is found in all dry washes and canyons.

Deformation of the Ladron Mountains first occurred in Pre-Cambrian time. Following metamorphism and granitization of the Pre-Cambrian rocks, a strong north-westerly shear zone was produced. During Tertiary time early compressive forces from the southwest appear to have given rise to folds, faults, and uplifting.

4. Paleontology - Of interest to paleontologists are two formations on the Ladron Mountain. The Calaso formation, found lying in a north-south line along the western side of the hogback, contains fossils apparently representing a Kinderhook fauna, which seems to represent fauna found in the Escabrosa formation of Arizona, more than any other fauna found in New Mexico. Two Brachiopods, Dielasma chouteauensis and Spirifer centronatus, which are common in the Calaso formation are not found elsewhere in the state of New Mexico. The Kelly formation overlies the Calaso formation for most of its extent. It is much more extensive than the

Calaso formation and covers a large area of west-central New Mexico. It contains an abundance of various corals, brachipods and echinoderms.

5. Soils - Development of typical soil horizons is seldom found on Ladron Mountain. Soils are usually thin and rocky. They are gravelly loams and sandy loams underlain by granite. The only areas with appreciable soil depth are the lower canyon bottoms and valleys.

Three soil associations occur within the boundaries of the proposed primitive area: (10) Harvey-Witt-Pinon, (16) Chilton-Rough Broken Land, and (20) Rock Land-Chimayo-Luzena. (See Figure 7.) As noted below, land use of these soils is restricted to grazing.

Rock Land-Chimayo-Luzena association makes up the majority of the area. Nearly 100% of the land above 5800 feet elevation falls into this category. Because of the steepness of the slopes and rockiness of the soil, cattle grazing is not practical on much of this land.

The remaining land is made up of the two other associations - Harvey-Witt-Pinon, and Chilton-Rough Broken Land. Harvey-Witt-Pinon association comprises only a few acres near the northern boundary of the area, while the Chilton-Rough Broken Land surrounds the Rock Land-

# Soils

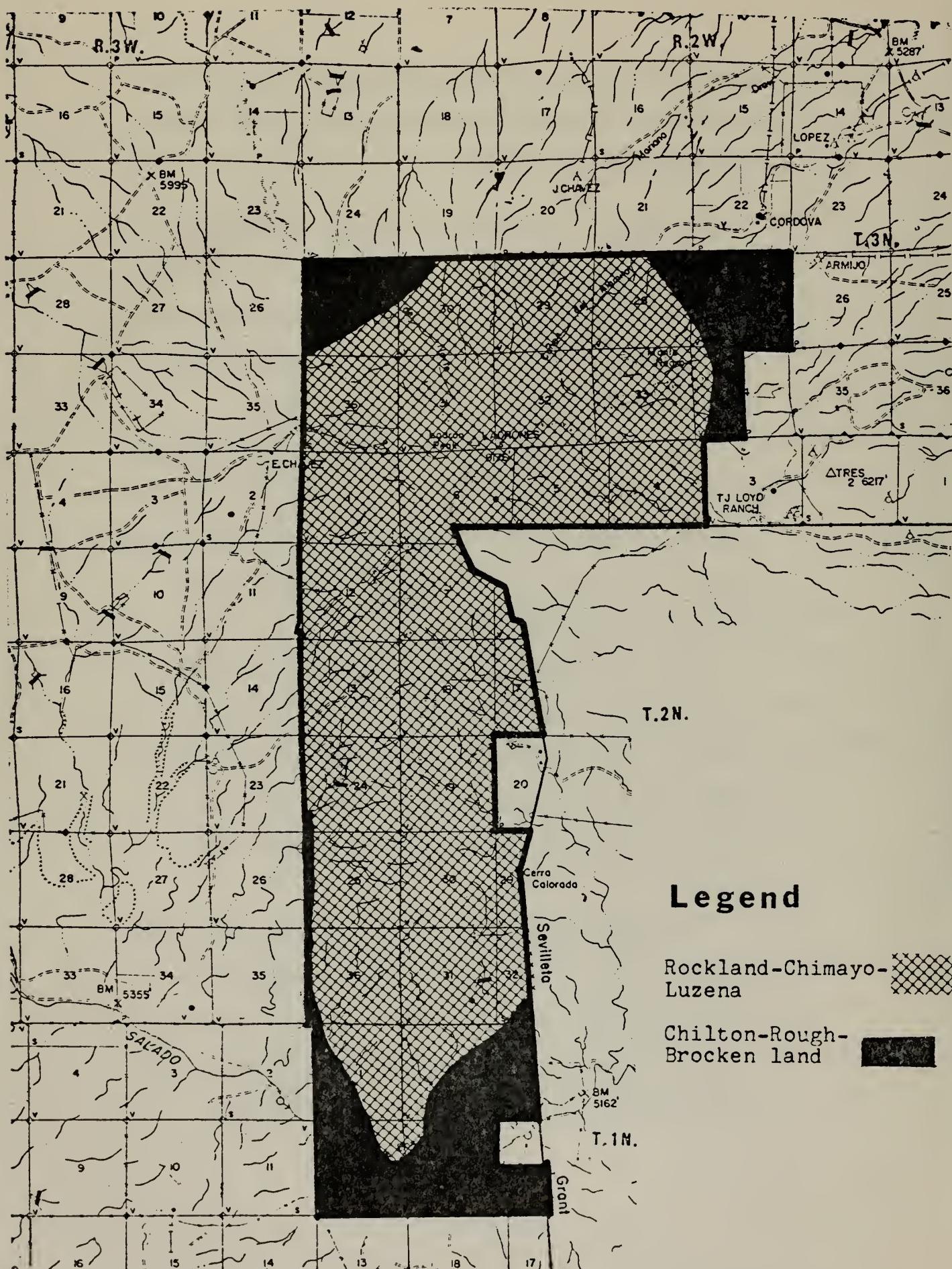


Figure No. 7

Chimayo-Luzena association as a narrow band to the north and west, extending itself to the south and east to comprise a large area of land west of the Rio Grande. These two associations support cattle and horse grazing and are used for the majority of the grazing in the area.

All of the above land mentioned, falls into the Land Class (6), which is unsuitable for irrigation. The above soils are well drained and erosion is generally light to moderate. But, observations in some specific localities reveal severe erosion problems.

6. Water - Ladron Mountain is drained by a radial pattern of intermittent streams. These streams eventually enter either the Rio Puerco, to the north, or the Rio Salado, to the south. Canon Del Alamito and Canon Del Norte, two major canyons, drain the mountain to the north into the Rio Puerco. The Rio Puerco is a large intermittent stream which enters the Rio Grande about 14 miles to the east of the mountains. To the south, less defined intermittent streams and canyons empty into the Rio Salado, a large intermittent stream that flows west to east about 7 miles south of Ladron Peak. The Rio Puerco and Rio Salado are two of the most important tributaries of the Rio Grande in New Mexico. They have very extensive watersheds but are dry, at least in their lower-most parts, during much of the year. However,

at times, particularly in the summer, they carry large quantities of sediment and are subject to flash floods. About 60% of the sediment production of the Rio Grande above San Marcial is derived from the Jemez, Rio Puerco, and Rio Salado tributaries.\*

There are numerous springs and seeps that occur on the mountain. (See Figure 2) At the present time there are four of these springs that have been developed. Three of these springs are located on the northern side of the mountain and one on the western side. The water from the spring on the western side is carried by a pipeline to a concrete tank near the old Chavez headquarters. On last observation the pipeline was in need of repair. There has also been some controversy as to where the spring actually exists. As best can be determined, it does occur in Section 6 which belongs to the Bureau of Land Management. Several of the other springs have been observed to run all year round. However, all of the seeps and some of the springs dry up during times of low precipitation.

In addition to the seeps and springs there are also two 5,000 gallon butyl rubber wildlife catchments located on the upper north and west sides of the mountain. These catchments have always held water since construction and provide excellent reliable water sources for wildlife. Both bags are reported to have numerous leaks caused by

\* Water Resources Council, 1968, page 6-12-13.

rodents and natural weathering of the rubber. They may have to be repaired or replaced in the near future to continue to provide adequate service.

Because of the thin rocky soil there is generally rapid run-off and little opportunity for storage of groundwater. Section 24 contains a livestock tank which collects runoff from storms. This tank will dry up at times of low precipitation.

At this time there are no developed water sources for human consumption in the area.

#### B. Living

1. Vegetation - The vegetation of Ladron Mountain is considered by many unique in many respects and must be considered one of the most important attributes to be preserved in the natural state. As Holland states, "The vegetation on the upper slopes is a strange (unique) mixture, due to uncommon combination of coolness and dryness. One does not find aspen and cactus side by side elsewhere. Some of the cholla forests on the eastern side upper slopes present about the most intimidating barrier one can imagine." The vegetation is influenced by several important factors which are peculiar of Ladron itself. Geographically it is located where the majority of New Mexico's floristic influences are in close contact. The fact that it is an isolated range, combined with its cool to moderately warm dry climate add to make Ladron Mountain

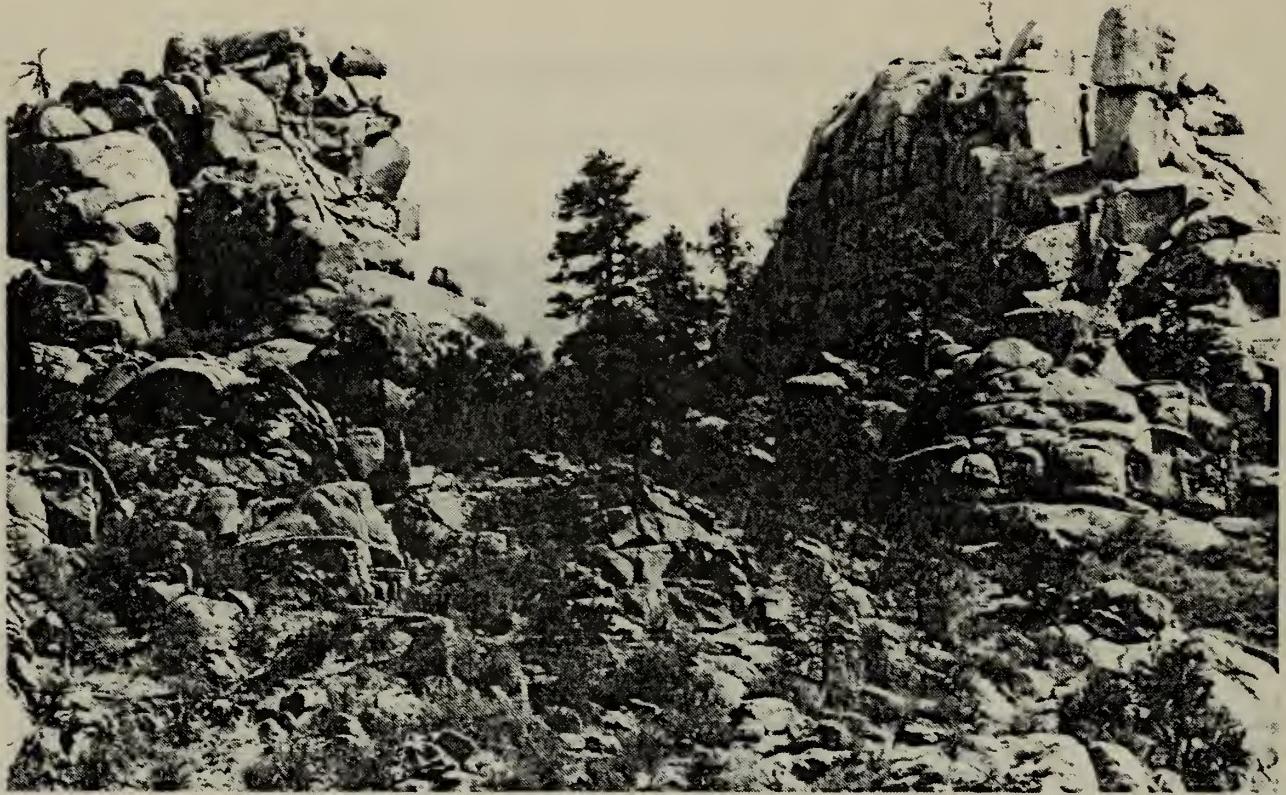


PHOTO 3 : Transitional Life Zone - Upper Portion of Ladron Mountain



PHOTO 4 : Pinon-Juniper Foothills of Ladron Mountain

similar to an island area where a high number of endemic species are expected to occur. From the limited studies already done on the area, several range extensions and a possible new species of the genus *Tradescantia* have been found.

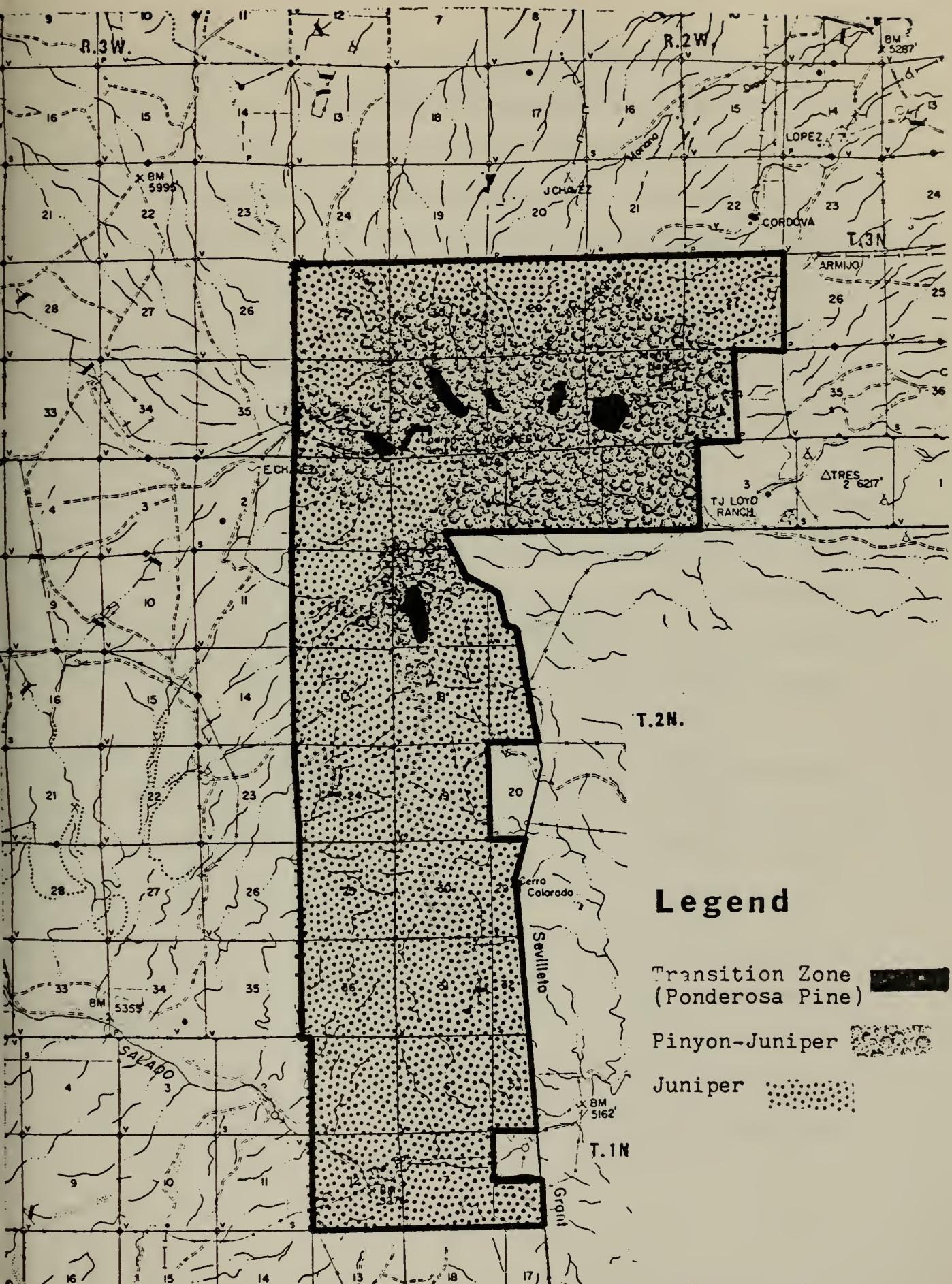
As stated by Howard and Sutcliffe, (1972), in the Ibex Report, "the Ladron Mountain range lies almost entirely within the Upper Sonoran Life Zone, and the tallest peaks are in the Transitional Life Zone". By the line point transect method, Howard and Sutcliffe (1972) determined approximately 46% perennial grasses and 45% shrubs made up nearly 91% of the vegetation, with Blue grama grass (Bouteloua gracilis) making up 40% of the perennial grasses. The total ground cover ranged from 23.1% to 42.6%. The majority of the washes that drain the mountain run east and west, thus creating many north-south microenvironments. Howard and Sutcliffe's study (1972) also showed a highly significant (P. 0.01) difference between many of the canyons studied.

An intensive floristic study of the Ladron area is presently being conducted by the author. The general vegetation of Ladron Mountain can be summarized as follows.

Most of the mountain is classified as Pinyon-Juniper habitat. (See Figure 8) There are moderate stands of Ponderosa pine (Pinus ponderosa) in some protected canyons above 7,000 feet. Two Douglas fir (Pseudotsuga menziesii)

and several small quaking aspen (*Populus tremuloides*) have been observed on the upper protected areas of the mountain. The lower canyons are typified by Scrub and Gray oaks (*Quercus turbinella* and *Q. grisea*), Apache plume (*Fallugia paradoxa*), and Skunk bush (*Rhus trilobata*). Above 6,500 feet Gambels oak (*Quercus gambelii*), occurs with Pinyon Pine (*Pinus edulis*) in areas where sufficient water is available. Many of the drier slopes, especially the eastern and northern slopes, consist mostly of perennial grasses, Blue grama (*Bouteloua gracilis*), being the dominant, Prickly pear cactus (*Opuntia polyacantha*), Bear grass (*Nolina microcarpa*), *Yucca glauca*, *Yucca baccata*, and the Cholla cactus (*Opuntia imbricata*). The upper rocky slopes (7,500-8,500 feet) are much the same as the lower dry slopes, however, Side-oats grama (*Bouteloua curtipendula*) tends to replace Blue grama and Skunk tree (*Ptelea angustifolia*) and Mountain mahogany (*Cercocarpus breviflorus*) become rather common. There is evidence that in the past the vegetation above 8,500 feet was characteristically Transitional Zone in nature. Isolated in some very protected areas near the peak, a few aspen survive with several species of mints, saxifrages, gooseberries and ferns. The lower southern end of the proposed area is an ecotonal zone between One-seeded juniper (*Juniperus monosperma*) and typical desert grassland habitats. The most common grasses in this area include 5 species of grama

# Vegetation



## Legend

Transition Zone  
(Ponderosa Pine)

Pinyon-Juniper

Juniper

Figure No. 8

grass (genus Bouteloua), June grass (Koeleria cristata), Ring muhly (Muhlenbergia torreyi), Mesa dropseed (Sporobolus flexuosus) and Burrow grass (Scleropogon brevifolius). Although some authorities believe the vegetation of the Ladron Mountain has reached a stable climax condition, there are many indications that the mountain's vegetation is at a very unstable state, where slight changes in any of the ecological factors influencing the nature of the vegetation could produce major changes in the vegetational composition. It is suggested that special care be taken to analyze future problems that may have an impact on the vegetation of this area.

2. Wildlife - A wide variety of wildlife exists on Ladron Mountain. Its remoteness, isolation, and varied habitats provide for 128 species of birds, 51 species of mammals, and 35 species of reptiles and amphibians. Birds, mammals, reptiles, and amphibians which are permanent or temporary visitors are listed in Appendix #3. Most of the mammals, except the bats, are residents while many of the birds are only seasonal visitors.

Cougar and Mule deer are the only big game animals that occur on the mountain, while Pronghorn antelope have been observed in the southern end of the area. In the past Ladron Mountain supported a moderate deer population that has since been greatly depleted. The reason for this

decrease is not understood at the present time. There seems to be abundant food available; possibly the lack of water and over kill during the hunting season are responsible for the decrease in numbers. It is estimated there are about 40 mule deer inhabiting the mountain (Siberian Ibex Report 1975). Additional deer may migrate into the Primitive Area from nearby areas to become temporary inhabitants. An estimate of about 20 deer were taken from the Ladron area during the 1975 season (Fish and Game, Socorro).

The peregrine falcon and spotted bat, both endangered species could occur on the mountain. No sightings have been made. The Rock rattlesnake occurs in the Magdalena mountains about 60 miles southwest of Ladron, and may exist in the area. This would be a northward range extension of about 60 miles.

Gambels and Scaled quail are present in sufficient numbers to attract a rather large number of hunters in the fall. Jackrabbits, Western cottontails, and Dove also provide game for hunters.

A skull positively identified as desert Bighorn skull has reportedly been found. There is some conjecture as to whether it was found, as some say, on Ladron Mountain. According to Sands (33) Ladron Mountain was never inhabited by either the Desert or Rocky Mountain Bighorn Sheep.

Because of its apparently ideal habitat, Ladron Mountain was recently considered (1974) as a release site for the Siberian Ibex (Capra Siberica). The Department of Game and Fish spearheaded the proposal for release of these exotics. The proposal was rejected by BLM after extensive environmental analysis and public input indicated the release was not environmentally acceptable.

3. Human Habitation - There are no permanent habitations within the proposed area. Two permanent residences, the Brown Ranch at the eastern base of the mountain, and the Jose Saiz house west of the mountain are the only inhabitants in the immediate area. Both of the above ranchers graze cattle and horses on a land allotment supervised by B.L.M. Three other small ranch houses serve as occasional residences. These are used for weekend, hunting, and round-up purposes. None of these occur within the area's proposed boundary. The old Chavez Headquarters is at the end of the most used access road on the western side of the mountain. If visitor use is increased vandalism may become a problem in this instance.

Around the base of the mountain are several other structures, most of these stone houses used by early inhabitants of the mountain. All are in bad state of repair and some may exist only as a foundation. There is also evidence of old corrals and some fences near these locations. There is no evidence of any habitation on the upper part of the mountain, although old camp sites left by herdsmen and hunters may be observed.

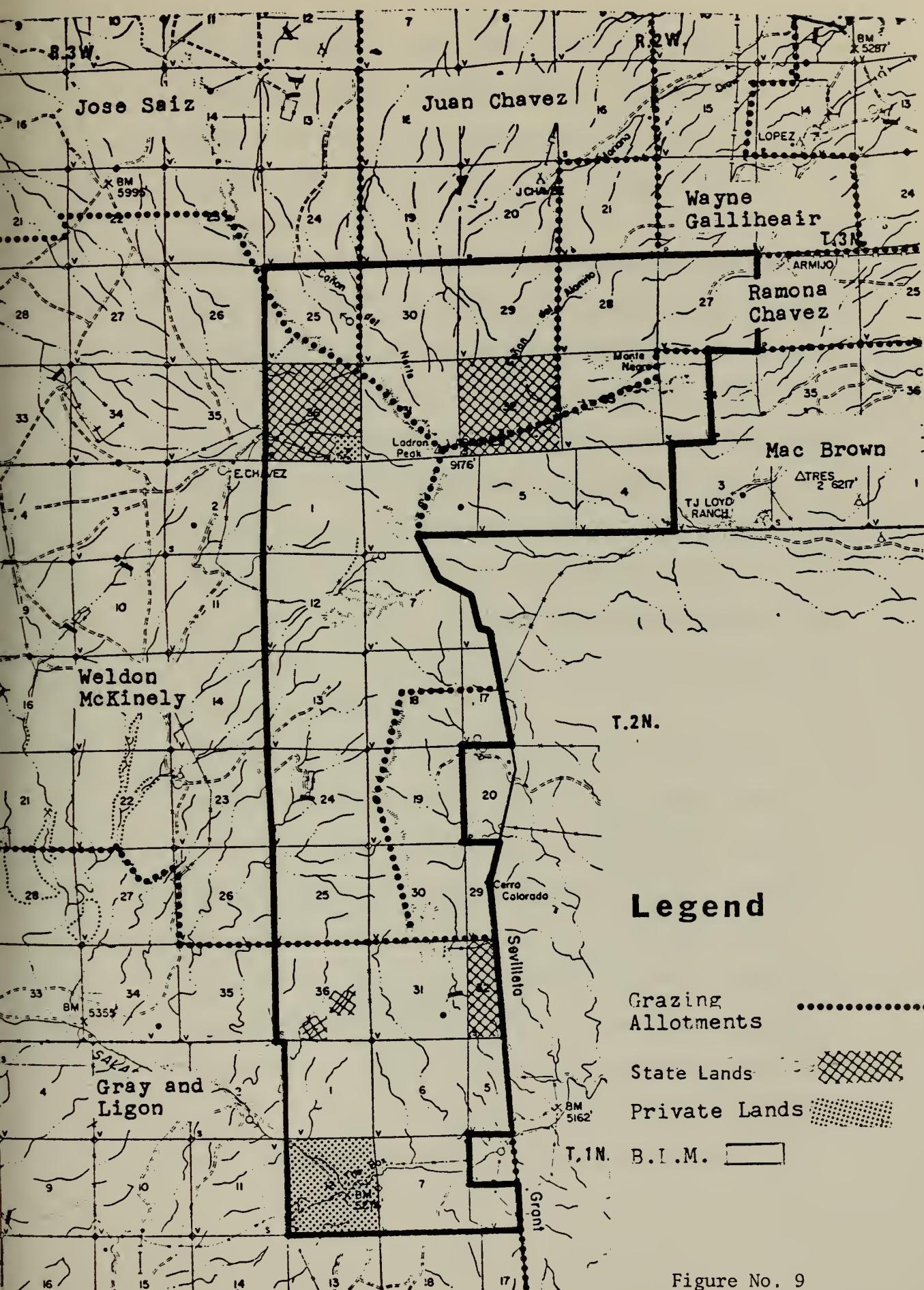
#### IV. ACCESS AND LAND STATUS

A. Access - Ladron Mountain Primitive Area is about 1½ hours drive from Albuquerque and about 1 hour from Belen and Socorro. Interstate I-25 is the major route used by these three cities. Bernardo exit is 50 miles and 25 miles south on I-25 from Albuquerque and Belen respectively, and approximately 25 miles north on I-25 from Socorro. The nearest eastern slopes are 14 miles from the Bernardo exit while the furthest southwestern slopes are nearly 35 miles away. All but the first 2 miles are on county and unimproved dirt ranch roads. The county maintained road begins 2 miles from the Bernardo exit where old highway 85 enters the Sevilleta Refuge. It continues for 30 miles where it then divides into numerous unimproved ranch roads. This road is maintained by occasional grading from the county. Generally it is passable for most normal passenger cars throughout the year, but passage may be rather difficult during inclement weather. The dirt ranch roads are sporadically maintained and offer extremely rough travel for passenger vehicles. Many of these ranch roads cross arroyos, using them as part of the road bed. These crossings are impassable for pick-up and 4-wheel drive vehicles during certain times of the year. The distance to be traveled on these unimproved roads, and their unpredictable state of repair makes it almost imperative that pick-up trucks or 4-wheel drive

vehicles be used to gain access. There are several other possible access routes consisting of unimproved dirt ranch roads from the south and western sides of the area. These roads are extremely rough, long, and involve crossing several large sandy washes. They are infrequently used by a few hunters , local residents, and 4-wheel drive enthusiasts.

There are 10 ranch roads from the county road that give access to the area. (See Figure 2) Three of these roads reach the eastern foothills. A greater share of their length is traced up arroyos where the presence of deep sand is a menace to two-wheel drive vehicles. All of these roads cross private land at one point or another. Three more roads reach the northern areas of the mountains. These are generally in much better shape, but are rough in spots from the presence of large rocks and boulders. Of these roads, one leads to Canon del Alamito. It is blocked by a fence on private land about one mile from the proposed boundary. The road leading to Canon del Norte travels through private land for some distance along a fence line. None of the remaining roads enter private land. If increased recreation use is expected for roads entering private land, access rights or easements should be obtained. Only two roads enter the area's proposed boundaries. Both roads extend about 3/4 of a mile inside the western boundary. One ends at the cattle tank in

# Land Status - Grazing Allotment



## Legend

- Grazing Allotments .....
- State Lands
- Private Lands
- T. 1 N. B.I.M. [ ]

Figure No. 9

Section 24, the other reaches a spring a short distance north of the tank. According to the provisions for establishing a primitive area, these roads would have to be blocked or have access controlled by B.L.M.

B. Land Status - The subject lands are about 89% B.L.M., 8% state, and 3% privately owned lands. (See Figure 9) The National Resource (B.L.M.) Lands were classified by NM 1239 for multiple use management. This action segregated the lands from appropriation under the agricultural land laws and from public sale under RS 2455, but left them open to all other applicable forms of appropriation including the mining and mineral leasing laws.

LAND STATUS

	<u>STATE</u>	<u>B.L.M.</u>	<u>PRIVATE</u>
Sections or parts thereof	4	30	2
Acres	1,514.64	16,153.64	636.16

TOTAL ACRES

18,304.44

The four blocks of state owned land have been leased by ranchers for grazing in conjunction with BLM land.

There isn't expected to be any conflict in the future involving the status of this land. The two parcels of privately owned land include a small 40 acre plot (3N., 3W., -36) and an entire section of 596.16 acres (1N., 3W., -12). The small 40 acre plot contains one of the springs that occur on the mountain. The owner wishes to retain ownership, as it is a valuable water source.

There is no conflict with the present owner over the use of the land at this time and none is foreseen in the future. Section 12 contains "The Box". It is important that this section be obtained for its unique primitive values. The owner, Mr. Ligon, has been open in the past for some type of land trade. A trade may be the best way to approach this acquisition.

The Sevilleta Wildlife Refuge forms most of the eastern boundary of the primitive area. About 12,000 acres of the upper mountain are included in the north-western corner of the refuge. This should be a "natural" part of the primitive area. However, past attempts to include this land have failed because of conflict with the reversion clause in the transfer of land from the Nature Conservancy to the U. S. Fish and Wildlife Service. Basically, the clause states that should Fish and Wildlife Service fail to administer the area for the benefit

of natural ecosystems it can revert back to the Nature Conservancy. As part of the transfer agreement, Fish and Wildlife Service is not allowed to give public access to the grant. There is little hope to obtain this land for future use because of this clause. There may also be future problems created by trespasses from B.L.M. land onto the Sevilleta Grant since there are no suitable boundary markers between the two adjacent pieces of land.

## V. LAND USE

### A. Land Use

The only productive economic activity of importance in this area is the production of cattle. A small amount of recreation, principally hunting, also generates income to the state business, but not to the residents because the majority of the area lands are not privately owned. There was a small amount of mineral production, principally uranium and manganese, in the 1945-1960 period. Presently there is one very small, somewhat active, cooper mining claim near the Emilia DeGeer place on the eastern side of the mountain. There has been oil and gas leasing and seismographic exploration of the flats northeast of the Ladron foothills, but there are no known plans to drill.

The land is presently leased for cattle grazing. (See Figure 9) The land is open to the public for recreation, mineral exploration and any other use prescribed by law. B.L.M.'s management program for the area has been under the Multiple Use Management Concept. This involves managing these resources for their grazing, mineral, watershed, wildlife, and recreation values.

There are no Rights-of-Way on the lands. A special land use permit was issued to the Atomic Energy Commission for a small (3 ft.) laser beam reflector atop Ladron Peak. This has since been removed. All mineral rights on the resource lands remain in federal ownership.

B. Mining

There has been little mining in the Ladron area in the past and there seems to be little possibility for development of this area in the future. Copper has been found in two places with unsuccessful commercial development.\* The Jeeter Mine east of the mountain produced a small amount of uranium in the 1950's. This spurred additional exploration activity on the northeastern slopes of the mountain as is evidenced by several large pits and scrapes on the surface. No other commercial uranium has since been found. All mineral rights on the resource lands remain in federal ownership.

C. Agriculture

No agricultural lands are present either on the mountain or the adjacent foothills. The closest crop-  
lands are some 15 miles away along the Rio Grande.<sup>1</sup>

D. Timber and Woodland

Timber and woodland products are present in small quantity and poor quality. These products have not been utilized in the past and are not likely to be in the future because Ladron Mountain is extremely rugged and

\* See Appendix No. 5

1. B.L.M. 1975, Environmental Analysis for the Proposed Release of Siberian Ibex on Ladron Mountain.

inaccessible. Furthermore, forest and woodland products are more abundant and readily accessible in a number of other areas in that vicinity.<sup>2</sup>

E. Domestic Livestock Grazing

The potential for grazing of cattle on the area under investigation is limited to the lower slopes because of the steep rocky slopes and lack of adequate water in the higher elevations. There is a small potential for grazing sheep and goats. It is limited due to the rough topography, need for herding, predators, unstable prices and lack of water.

\* There has been no use by sheep or goats since World War II.\*

F. Wildlife Habitat

The area has an excellent potential for wildlife, especially Mule deer. The Ibex Report (1975) concludes that the mountain could support a small population of Ibex. In the past Ladron is reported to have supported a substantial Mule deer population. The present small herd utilizes very little of the available natural food sources. Populations of birds and small animals are limited. The Ibex report states the predator level as being rather low. In the past however, both goat herders and cattlemen have been bothered by predation of their stock. Personal

2. B.L.M. 1975, Environmental Analysis for the Proposed Release of Siberian Ibex on Ladron Mountain.

\* B.L.M. Unpublished Resource Analysis of Ladron Mountain.

observation indicates there is an abundance of coyotes in the area. Rather good evidence also indicates there is at least one pair of Golden Eagles which nest on the mountain. The predator level and lack of water during dry periods throughout the year may be important factors in the lower deer population, and the low number of birds and small mammals.

G. Watershed Protection

Rio Puerco and Rio Salado drain Ladron Mountain. They are two of the largest seasonal tributaries of the Rio Grande in the state of New Mexico. They also carry a very heavy sediment load into the Rio Grande. It is important that these two watersheds be managed with good conservation practices so that there is no increase in the sediment load they contribute to the Rio Grande.

H. Public Purposes

The fact that it is a "natural" area would help maintain the social and cultural heritage of the local residents and also has high potential for an ecological study area for local conservation groups, high schools, and universities. Hiking and hunting are the two major recreational uses at the present.

## VI. LAND USE ANALYSIS CONCLUSIONS

From data presented, it is found that the subject land is a compact block of predominantly (89%) public domain land, desert mountain in character.

Ladron Mountain has been relatively untouched by man because of its extreme ruggedness, lack of water, and low economic potential of its natural resources.

The vegetation seems to be in a rather unstable state, although it presently may seem climax in nature. Fencing the area to preserve its natural values seems unnecessary and furthermore may be harmful to wildlife, aesthetics, recreation users and neighboring ranchers.

There is no known pressure for more intensive commercial use of the mountain by any user group. Recreation groups, such as the Wilderness Society, have actively pursued the recommendations for withdrawal of the mountain from mineral location and for some official designation such as Wilderness Area, Primitive Area, or Natural Area. Evidence seems to indicate that designation as Primitive Area would satisfy most of the groups involved. The boundary lines drawn for the proposed primitive area are natural boundaries in that they encompass as much land in a single block that offers good primitive values.



## **APPENDICES**



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PRELIMINARY CHECKLIST  
OF THE FLORA OF  
SEVILLETA REFUGE  
AND  
LADRON MOUNTAIN



Polpodiaceae.

- Cheilanthes  
  eatonii Baker  
  feeii Moore  
  fendleri Hook  
Cystopteris  
  fragilis (L.) Bernh., Schrad  
Notholeana  
  standleyi Maxon  
Pellaea  
  fendleri (Kunze.), Prantl  
  Longimucronata Hook.

Selaginellaceae.

- Selaginella  
  underwoodii Hieron.

Pinaceae.

- Pinus  
  edulis Engelm.  
  \*flexilis James  
  ponderosa var. scopulorum Engelm  
Pseudotsuga  
  menziesii (Mirbel.)

Cupressaceae.

- Juniperus  
  \*communis L.  
  deppiana Steud.  
  monosperma (Engelm.) Sarg.  
  \*scopulorum Sarg.

Ephedraceae.

- Ephedra  
  torreyana Wats.  
  \*Trifurca Torr.  
  viridis Cov.

Alismataceae.

- Sagittaria  
  \*cuneata Sheld.

\* Plants not expected  
to occur on  
Ladron Mountain

Zanichellaceae.

Zanichellia  
\* palustris L.

Commelinaceae.

Commelina  
dianthifolia Delile  
Tradescantia  
pinetorum Greene  
\* scopulorum Rose

Liliaceae.

Allium  
cernuum Roth  
geyeri Wats.  
\* macropetalum Rydb.  
Anthericum  
\* torreyi Baker

Typhaceae.

Typha  
angustifolia L.  
\* Latifolia L.

Agavaceae.

Nolina  
microcarpa Wats.  
\* texana Wats  
Yucca  
baccata Torr.  
elata Engelm.  
glaucia Nutt.

Juncaceae.

Juncus  
balticus Wild.  
bufonis L.  
\* interior L.  
\* mexicanus Willd.  
torreyi Cov.

Cyperaceae.

Carex

praegracilia Boott  
\* siccatae Dewey

Cyperus

esculentas L.  
fendlerianus Boeckl.

Eleocharis

macrostachya Britt.  
\* parishii Britton

Scirpus

acutus Muhl.  
\* americanus Pers.  
\* paludosus A. Nels.

Gramineae.

Agropyron

\* cristatum (L.) Gaertn.  
\* desertorum (Fisch.) Schult.  
\* inerme  
pseudorepens Scrib. & Smith  
riparius Scrib. & Smith  
smithii Rydb.  
subsecundum (Link) Hitchc.

Agrostis

alba L.  
scabra Willd.  
semiverticillata (Fosk.) C. Chr.

Alopecurus

aequalis Sobol.

Andropogon

barbinodes Lag.  
cirratus Hack.  
hallii Hack.  
saccharoides S.W.  
scoparius Michx.

Avena

Sativa L.

Aristida

anscensionis L.  
arizonica Vasey  
barbarata Fourn.  
divircata Humb. & Bompal.  
fendleriana Steud.

- Aristida
- \* glaucha (Ness.) Walp.
  - Longiseta Steud.
  - \* Hamulosa Henr.
  - \* Pansa Woot. & Standl.
  - wrightii Nash
- Blepharoneuron
- tricholepis (Torr.) Nash
- Bouteloua
- barbata
  - \* aristoides (H.B.K.) Griseb.
  - curtipendula (Michx.) Torr.
  - eriopoda (Torr.) Torr.
  - gracilis (H.B.K.) Lag.
  - hirsuta Lag.
  - \* Parryi (Fourn.) Griffiths
  - simplex Lag.
- Bromus
- anamolus Rypr.
  - \* carinatus Hook. & Arn.
  - cilliatus L.
  - \* inermis Leyss.
  - japonicus Thunb.
  - marginatus Ness.
- Cenchrus
- \* echinatus L.
  - pauciflorus Benth.
- Chloris
- virgata S.W.
- Distichlis
- stricta (Torr.) Rydb.
- Enchinocloa
- crusgalli (L.) Beauv.
- Elymus
- triticoides Buckl.
- Enneapogon
- derauxii Beauv.
- Eragrostis
- ciliianensis (All.) Link
- Eriochloa
- \* gracilia (Fourn.) Hitchc.
- Festuca
- arizonica Vasey
  - octaflora Walt.
- Hilaria
- jaesii (Torr.) Benth.
- Hordeum
- jabatum L.
- Koelaria
- cristata (L.) Pers.

Lycurus  
phleoides H.B.K.

Melica  
\* porteri Scribn.

Muhlenbergia  
arenacea (Buckl.) Hitchc.  
arenicola Buckl.

Asperifolia (Nees. & Mey.) Parodi  
\* dubia Fourn.  
emersleyi Vasey  
montana (Nutt.) Hitchc.  
pauciflora Buckl.  
porteri Scribn.  
pungens Thurb.  
\* setifolia Vasey  
torreyi (Kunth) Hitchc.

Munroa  
squarrosa (Nutt.) Torr.

Oryzopsis  
hymenoides (R. & S.) Ricker  
micrantha (Trin. & Rupr.) Thurb.

Panicum  
obtusum H.B.K.

Phleum  
partense L.

Phragmites  
\* communis Trin.

Piptochaetium  
fimbriatum (H.B.K.) Hitchc.

Poa  
fendleriana (Steud.) Vasey  
\* interior Rydb.  
\* longiligula Scribn. & Williams  
pratensis L.  
\* occidentalis

Polypogon  
monspeliensis (L.) Desf.

Schedonnardus  
paniculatus (Nutt.) Trel.

Scleropogon  
brevifolius Phil.

Setaria  
\* lutescens (Weigel) Hubbard  
macrostachya H.B.K.  
viridis (L.) Beauv.

Sitanion  
hystrox (Nutt.) J.G. Smith

Sorghum  
halepense (L.) Pers.

- Sporobolus
- airoides Torr.
  - contractus Hitchc.
  - cryptandrus (Torr.) Gray
  - flexuosus (Thurb.) Rydb.
  - giganteus Nahs
  - wrightii Munro
- Stipa
- neomexicana (Thurb.) Scribn.
  - robusta (Vasey) Scribn.
- Tragus
- berterionaus Schult.
  - \* racemosus (L.) All.
- Trichachne
- californica (Bent.) Chase
- Tridens
- pilosus (Buckl.) Hitchc.
  - pulchellus (H.B.K.) Hitchc.

Seqruraceae.

- Anemopsis
- californica (Nutt.) Hook & Arn.

Rannunculaceae.

- Aconitum
- columbianum Nutt.
- Aquilegia
- chrysanthia Gray
  - \* triternata Payson
- Clematis
- bigelovii Torr.
  - ligusticifolia Nutt.
  - pseudoalpina (Kuntz) A. Nels.
- Pulsatilla
- \* ludoviciana (Nutt.) Hellner
- Rannunculus
- cymbalaria Pursh.
- Thalictrum
- fendleri Engelm.

Berberidaceae.

- Berberis
- \* fremontia Torr.
  - \* haematocarpa Woot.
  - repens Lindl.

Papaveraceae.

Argenome

- \* pleiacantha Green
- \* polyganthemos (Fedde) Ownbey

Fumariaceae.

Corydalis

- aurea Wild.

Junglandaceae.

Junglans

- \* major (Torr.) Heller

Fagaceae.

Quecus

- gambellii Nutt.
- grisea Liebm.
- turbinalla Greene
- undulata Torr.

Nyctaginaceae.

Allionia

- incarnata L.

Ammocondon

- chenopolioides (Gray) Standl.

Beorhaavia

- erecta L.

- torreyana (Wats.) Standl.

Mirabilia

- \* comata (Small) Standl.
- \* glabra (Wats.) Standl.
- linearis (Pursh.) Heimerl.
- multiflora (Torr.) Gray
- oxybaphoides Gray

Tripterocalyx

- carnea (Greene) Galloway

Aizoiaceae.

Sesuvium

- \* verrucosum af.

Caryophyllaceae

Cerastium

- arvense L.

Cerastium  
  brachypodium (Engelm.) Robins  
  \* nutans Raf.  
Drymeria  
  \* fendleri Wats.  
Silene  
  antirrhina L.  
  lacinata Cav.  
  \* scouleri Hook  
Stellaria  
  jamesiana Torr.  
  longifolia Muh..  
  longipes Goldie

Portulacaceae.

Portulaca  
  pilosa  
  retusa Engelm.

Chenopodiaceae.

Atriplex  
  \* argentea Nutt.  
  canescens (Pursh) Nutt.  
Chenopodium  
  album L.  
  \* bitrys L.  
  fremontii Wats.  
  incanum (Wats.) Heller  
  incisum  
  leptophyllum Nutt.  
  rubrum L.  
  \* watsonii A. Nels.  
Corispermum  
  nitidum Kit.  
Cycloloma  
  atriplicifolium (Spreng.) Coult.  
Eurotia  
  lanata (Pursh) Moq.  
Kochia  
  scoparia (L.) Schrad.  
Salsola  
  kali L.  
Sarcobatus  
  vermiculatus (Hook) Torr.  
Sueda  
  suffrutescens Wats.  
  torreyana Wats.

Amaranthaceae.

Acnthochiton

\* wrightii Torr.

Amaranthus

graecizans L.

hybridum L.

palmeri Wats.

powellii Wats.

retroflexus L.

wrightii Wats.

Brayulinea

\* densa (Hump. & Bopl.) Small

Froelichia

floridana (Nutt.) Moq.

\* gracilis (Hook) Moq.

Gomphrena

\* caespitosa Torr.

Tidestroma

languinosa (Nutt.) Standl.

Polygonaceae.

Eriogonum

\* abertianum Torr.

alatum Torr.

\* bicolor

\* corymbosum Benth.

\* harvardii Wats.

\* hieracifolium Benth.

jamesii Benth.

polycladon Benth.

racemosum Nutt.

rotundifolium Benth.

wrightii Torr.

Polygonum

\* aviculare L.

convolvulus L.

\* lapathifolium L.

persicaria L.

Rumex

acetocella L.

altissimus Wood

crispus L.

hymenospelaus Torr.

mexicanus Meisn.

\* triangulivalvis (Denser) Rech.f.

Guttifereae.

Hypericum  
formosum H.B.K.

Malvaceae.

Abutilon  
\* parvulum Gray  
Anoda  
\* cristata (L.) Schlecht.  
Malva  
nglecta Wallr.  
Sida  
hederacea (Dougl.) Torr.  
lepidota Gray  
Sphaeralcea  
\* angustifolia (Cav.) G. Don  
coccinea (Pursh.) Rydb.  
\* digitata (Greene) Rydb.  
fendleri Gray  
incana Torr.  
\* leptophylla (Gray) Rydb.  
\* lobata  
subhastata Coult.

Tamaricaceae.

Tamarix  
\* gallica L.  
pentandra Pall.

Loasaceae.

Cevallia  
sinuata Lag.  
Mentzelia  
\* lacinata (Rydb.) Darl.  
\* multicaulis (Osterh.) Darl.  
multiflora  
pumila (Nutt.) Torr. & Gray

Cucurbitaceae.

Cucurbita  
foetidissima H.B.K.  
Echinopepon  
\* wrightii (Gray) Wats.  
Sicyos  
\* ampelophyllum Woot. & Standl.

Salicaceae.

Polulus

- acuminata Rydb.  
angustifolia James  
freemontii Wats.

Salix

- \* argophylla  
exigua Nutt.  
irrorata Anders.

Capparidaceae.

Cleome

- senrulata Pursh.

Polansia

- trachysperma Torr. & Gray  
\* uniglandulosa (Gav.) D.C.

Wislizenia

- \* refracta Engelm.

Cruciferea.

Camelina

- \* microcarpa Andrz.

Capsella

- bursa-pastoris (L.) Medic

Descurania

- \* californica (Greene) O.E. Shulz  
obtusa (Greene) O.E. Schulz  
pinnata  
richardsonii (Sweet) O.E. Shulz

Dithyrea

- wislizeni Engelm.

Draba

- aurea Vahl.  
\* cuneifolia Nutt.  
hellerona Greene  
\* mogollonica Greene

Erysimum

- asperum (Nutt.) D.C.  
capitatum (Dougl.) Greene

Halimolobus

- \* diffusus (Gray) O.E. Shulz

Lepidium

- densiflorum Schrad.  
lasiocarpum Nutt.  
montanum Nutt.

Lesquerella  
  fendleri (Gray) Wats.  
  gordonii (Gray) Wats.  
\* pinetorum Woot. & Standl.

Lesquerella  
  praecox Woot. & Standl.

Rorippa  
  pasturantium-aquiticum (L.) Schinz & Thell.

Selenia  
\* dissecta

Sisymbrium  
  linearifolium (Gray) Payson

Streptanthus  
  validus (Greene) Cory

Thelopodium  
  longifolium (Benth) Wats.  
\* micranthum (Gray) Wats.  
wrightii (Gray)

Ericaceae.

Pyrola  
\* picta J.E. Smith  
Monotropa  
latisquama (Rydb.) Hult.

Primulaceae.

Androsace  
\* septentrionalis var. puberlenta (Rydb.) Knuth  
Centunculus  
\* minimus L.

Hydrangeaceae.

Fendlera  
  rupicola Gray  
Philadelphus  
\* argenteus Rydb.  
\* agyrocalyx Woot.  
microphyllus Gray  
\* occidentalis A. Nels

Grossulaiaceae.

Ribes  
\* americanum Mill.  
aureum Pursch.

cereum Dougl.  
inebrians Lindl.  
\* inerme Rydb.  
leptanthum Gray

Saxifragaceae

Heuchera  
\* parvifolia Nutt.  
pulchella Woot. & Standl.  
verisicolor Greene  
wootonii  
Jamesia  
americana Torr. & Gray

Crassulaceae.

Sedum  
cockerellii Britt.  
wrightii Gray

Rosaceae.

Cercocarpus  
montanus Raf.  
Cowania  
\* mexicana D. Don  
Fallugia  
paradoxa (D. Don) Endl.  
Fragaria  
bracteata Heller  
Holodiscus  
ducosus (Nutt.) Rydb.  
Petrophytum  
caespitosum (Nutt.) Rydb.  
Physocarpus  
monogynus (Torr.) Coulter.  
Prunus  
serotina Ehrh.  
virginiana L.  
Rosa  
\* stellata Woot.  
fendleri Crepin  
Rubus  
\* neomexicanus Gray  
parviflorus Nutt.  
strigosus Michx.  
Sanguisorba  
\* minor

Leguminosae.

- Amorpha  
fruticosa
- Astragalus  
allochrous Gray  
flexuosus Dougl.
- Astragalus  
\* giganteous Wats.  
\* humistratus Gray  
lentiginous Dougl.  
\* missouriensis Nutt.  
\* mollisimus  
tephroides Gray  
nuttallianus D.C.  
\* praelongus Sheld  
\* tenellus Pursh  
wootonii Sheld
- Caesalpinia  
gilliesii Wall.
- Calliandra  
humilis Benth
- Dalea  
brachystachys Gray  
formosa Torr.  
jamesii (Torr.) Torr. & Gray  
leporina (Ait.) K & P  
nana Torr.  
scoparia Gray  
terminalis Jones
- Desmanthes  
illinoensis (Michx.) MacM
- Glycyrrhiza  
lepidota (Nutt.) Pursh
- Hoffmannseggia  
densiflora Benth  
drepanocarpa Gray  
jamesii Torr. & Gray
- Lathyrus  
arizonicus Britt.  
\* eucosmus Butt. & St. John  
\* graminifolius (Wats.) White
- Lupinus  
kingii Wats.
- Medicago  
lupulina L.  
sativa L.

- Melilotus  
albus Ders.  
officinalis (L.) Lam.
- Oxytropis  
sericea Nutt.
- Petalostemum  
candidum (Willd.) Michx.  
\* exile Gray  
\* prostratum Wott. & Standl.  
purpureum (Vent.) Rydb.
- Prosopsis  
glandulosa Torr.
- Psoralea  
tenuiflora Pursh.
- Sophora  
\* sericea
- Swainsona  
\* salsula
- Thermopsis  
pinetorum Greene
- Trifolium  
fendleri Greene  
\* hybridum L.  
repens L.
- Vicia  
americana Muhl.  
pulchella H.B.K.

Onagraceae.

- Epilobium  
californicum Hausskn.  
sacmontanum Hausskn.
- Guara  
coccinea Nutt.  
gracilis Woot. & Standl.  
parviflora Dougl.
- Oenothera  
albicaulis Pursh  
caespitosa Nutt.  
coronopifolia Torr. & Gray  
\* fillifolia (Eastw.) Tides  
hartweggii Benth.  
hookeri Torr. & Gray  
lavandulaefolia Torr. & Gray  
\* neomexicana (Small) Munz  
\* runcinata (Engelm) Munz.

**Eleaganaceae**

Eleagaus  
angustifolia L.  
Garryaceae  
Garreya  
wrightii Torr.

**Santalacea**

Comandra  
pallida A.DC.

**Loranthaceae**

Arceathobium  
campylopodium Engelm.  
vaginatum (H.B.K.) Eichler  
Phoradendron  
bolleanum (Seem) Eichler  
coryae Trel.  
heavardianum Trel.  
juniperinum Englem.  
flavescens (Pursh) Nutt.  
orbiculatum

**Euphorbiaceae.**

Acalypha  
\* neomexicana Muell. Arg.  
Croton  
\* dioicus Cav.  
texensis (Klotsch) Muell. Arg.  
Euphorbia  
\* acuta Engelm.  
albomarginata Torr. & Gray  
\* alta Norton  
dentata Michx.  
existipulata Engelm.  
fendleri Torr. & Gray  
\* geyeri Engelm.  
\* lata Engelm.  
\* lurida Engelm.  
\* montana  
revoluta Engelm.  
serpyllifolia Pers.  
serrula Engelm.  
Spathulata Lam.  
stictospora Engelm.

Reverchonia  
\* arenaria Gray  
Tragia  
\* amblyodonata  
stylaria Muell. Arg.

Rhamnaceae.

Ceanothus  
fendleri Gray

Vitaceae

Parthenocissus  
inserta (Kerner) K. Fritsch  
Vitis  
arizonica Engelm.

Aceraceae.

Acer  
\* glabrum Torr.  
negundo L.

Anacardiaceae.

Rhus  
\* glabra L.  
microphylla Engelm.  
radicans L.  
trilobata Nutt.

Rutaceae.

Ptelea  
angustifolia Benth.  
pallida Greene  
\* trifoliata

Zygophyllaceae.

Kallstroemia  
californica (Wats.) Vail  
\* hirsutissima Vail  
parviflora Norton  
Larrea  
tridentata (DC.) Cov.

Tribulus  
terrestris L.

Oxalidaceae.

Oxalis  
\* metcalfei  
stricta L.  
\* violacea L.

Geraniaceae.

Erodium  
cicutarium (L.) H'Her  
Geranium  
caespitosum James  
\* fremontii Torr.

Linaceae.

Linum  
aristatum Engelm.  
lewissii Pursh  
puberulum (Englem.) Heller  
vernale Woot.

Polygalaceae.

Polygala  
alba Nutt.  
\* longa Blake

Araliaceae.

Aralia  
racemosa L.

Umbelliferae.

Aletes  
acaulis (Torr.) Coult. & Rose  
Cicuta  
douglasii (DC.) Coult. & Rose  
Conium  
\* maculatum L.  
Cymopteris  
\* fenderi Gray  
Ozmprhiza  
obtusa (Coult. & Rose) Fern.

Pseudocymopteris  
montanus (Gray) Coult. & Rose

Gentianaceae.

Centaureum  
calycosum (Buckl.) Fern  
Eustoma  
\* exaltatum  
Gentiana  
\* affinis Griseb.

Apocynaceae.

Apocynum  
androsaemifolium L.  
Macrosiphonia  
\* brachysiphon (Torr.) Gray

Asclepiadaceae.

Asclepias  
asperula (Dcne.) Woodson  
brachystephana Engelm.  
engelmanniana Woodson  
\* involucrata Engelm.  
latifolia Raf.  
subverticillata (Gray) Vail  
tuberosa L.

Solanaceae.

Chamaesarma  
\* copioides (Moric) Britt.  
\* coronopus (Dunal) Gray  
Datura  
metelioides  
quercifolia H.B.K.  
Lycium  
pallidum Miers  
Physalis  
cordifolia  
foetens Poir  
hederaefolia Gray  
virginiana Mill.  
douglassii Dunal  
elaeagnifolium Cav.

heterodoxum Dunal  
jamesii Torr.  
rostratum Dunal  
triflorum Nutt.

Convolvulaceae.

Convolvulus  
    arvensis L.  
    incanus Vahl.  
Cressa  
    \* truxillenis H.B.K.  
Cuscuta  
    campestris Yuncker  
Ipomea  
    \* coccinea L.  
    \* costellata Torr.  
    \* hirsutula Jacq.

Polemianaceae.

Gila  
    rididula Benth.  
    sinuata Dougl.  
    subnuda Torr.  
Ipomopsis  
    aggregata (Pursh) V. Grant  
    multiflora (Nutt.) V. Grant  
    pumila (Nutt.) V. Gran  
    laxiflora (Coulter.) V. Grant  
    longiflora (Torr.) V. Grant  
    multiflora (Nutt.) V. Grant  
Microsteris  
    gracilia (hook) Greene  
Phlox  
    nana Nutt.  
    \* mesoleuca Greene  
    \* triovulata Thurb.  
Polemonium  
    \* flavum Greene  
    \* filicinum Greene  
    \* foliosissimum Gray

Hydrophyllaceae.

Nama  
    \* dichotomum (Rap.) Shoisy  
    hispidum Gray

Phacelia

- \* coerulea Greene
- heterophylla Pursh
- integrifolia Torr.
- intermedia Woot.
- magellanica
- neomexicana Thurb.
- popei Torr. & Gray

Boraginaceae.

Coldenia

- \* hispidissima (Torr.) Gray

Cryptantha

- crassisepala (Torr. & Gray) Greene
- jamesii (Torr.) Payson

Cynoglossum

- officinalis L.

Hackelia

- pinetorum (Greene) Johnst.

Heliotropium

- convolvulaceum (Nutt.) Gray
- \* curassavicum L.

Lappula

- redowskii (Horem.) Greene.

Lithospermum

- \* cobrense Greene
- incisum Lehm.
- multiflorum Torr.

Mertensia

- franciscana Heller

Verbenaceae.

Aloysia

- \* wrightii (Gray) Heller

Verbena

- ambrosiaeefolia Rydb.
- bipinnatifida Nutt.
- bracteata Lag. & Radl.
- ciliata Benth.
- Macdougliei Heller
- wrightii Gray

Labiatea.

Agastache

- \* micrantha (gray) Woot. & Standl.
- pallidiflora (Heller) Rydb.

Clinopodium  
vulgare L.  
Hedeoma  
\* ciliata  
drummundi Benth.  
\* nana (Torr.) Briq.  
\* oblongifolium (Gray) Heller  
Marrubium  
vulgare L.  
Mentha  
arvensis L.  
Monarda  
menthaefolia Graham  
pectinata Nutt.  
Salvia  
henryi Gray  
reflexa Hornem.  
subincisa Benth.  
Teucrium  
laciniatum Torr.

Plantaginaceae.

Plantago  
lanceolata L.  
major L.  
purshii R. & S.

Oleaceae.

Foresteria  
neomexican Gray  
Fraxinus  
\* pennsylvanica Marshall  
Menodora  
scabra Gray

Scrophulariaceae.

Castilleja  
integra Gray  
lineriaeafolia Benth  
Maurandya  
antirrhimifolia Humb. & bompl.  
Mimulus  
\* glabratus H.B.K.  
guttatus DC.

Pedicularis  
centranthera Gray

Penstemon

- ambiguus Torr.
- barbatus (Cav.) Roth
- fendleri Torr. & Gray
- jamesii Benth.
- \* Oliganthes Woot. & Standl.
- \* strictus Benth.
- \* virgatus Gray
- whippleanus Gray

Verbascum

- thapsus L.

Veronica

- americana (Raf.) Schwein.
- peregrina L.

Orobanchaceae.

Conopholus

- \* alpina
- mexicana Gray

Orobanche

- multiflora Nutt.

Bignoniaceae.

Chilopsis

- linearis (Cav.) Sweet

Martyniaceae.

Proscidea

- parviflora (Wott. & Standl.)

Campanulaceae.

Campanula

- \* rotundiflora L.

Rubiaceae.

Galium

- aparine L.
- fendleri Gray
- \* triflorum Michx.

Houstonia

- \* polyprenoides Gray
- \* rubra Cav.
- \* wrightii Gray

Caprifoliaceae.

- Lonicera  
\* albiflora Torr. & Gray  
\* arizonica Rehder  
involucrata (Richards) Banks  
Sambucus  
\* melanocarpa Gray  
\* mexicana Presl.  
Symphorocarpus  
oreophilus Gray  
\* utahensis Rydb.

Valerianaceae.

- Valeriana  
acuticoba Rydb.

Compositae

- Achillea  
lanulosa Nutt.  
Ambrosia  
artemesifolia L.  
Aphanostephus  
\* arizonicus Gray  
Artemesia  
bigelovii Gray  
\* campestris  
carruthii Wood  
dracunculus Pursh  
filifolia Torr.  
frigida Willd.  
ludoviciana Nutt.  
Aster  
\* arenosus  
\* commutatus  
\* exilis Ell.  
\* hirtifolius  
\* parvulus  
spinosus Benth  
\* subulatus  
tanacetifolias  
Baccharis  
emoryi Gray  
glutinosa Pers.  
\* pteronioides DC.  
salicina Torr. & Gray  
wrightii Gray

Bahia

- \* absinthifolia Benth.
- dissecta (Gray) Britt.
- neomexicana Gray
- \* woodhousei Gray

Baileya

- multiradiata Harv. & Gray

Berlandiera

- lyrata Benth.

Bidens

- frondosa L.
- \* laevis B.S.P.
- \* pilosa L.
- tenuisecta Gray

Brickellia

- baccharidea Gray
- brachyphylla Gray
- californica Torr. & Gray
- fendleri Gray
- floribunda Gray
- grandiflora

Centurea

- \* repens L.

Chrysopsis

- foliosa Nutt.
- fulcrata Greene
- hispida (Hook) DC.
- villosa (Pursh) Nutt. ex. DC.

Chrysothamnus

- \* pulchellus (Gray) Greene
- viscidiflorus (Hook) Nutt.

Cirsium

- \* megacephalum (Gray) Cockl.
- neomexicanum Gray
- ochreocentrum Gray
- \* perennans
- pulchellum (Greene) Woot. & Standl.
- \* undulatum (Nutt.) Spreng.
- wheeleri (Gray) Petrak.

Clappia

- \* psuedifolia

Conza

- canadensis (L.) Cronq.
- coulteri Gray
- schiedeana (Less.) Cronq.

Coreopsis

- cardaminefolia (DC.) Torr. & Gray

- Cosmos  
  parviflorus (Jacq) H.B.K.  
Dysodia  
  acerosa DC.  
  papposa (Vent.) Hitchc.  
Engelmannia  
  pinnatifida Torr. & Gray  
Erigeron  
  \* bellidiastrum Nutt.  
  \* canadensis  
    divergens Torr. & Gray  
    flagellaris Gray  
  \* philadelphicus L.  
    speciosus (Lindl.) DC.  
    subtrinervis Rydb.  
Eupatorium  
  hrbaceum (Gray) Greene  
Franseria  
  acanthicarpa Hook & Cov.  
  confertiflora (DC.) Rydb.  
Gaillardia  
  pinnatifida Torr.  
  \* pulchella Foug.  
Gnaphalium  
  chilense Spreng.  
  macounii Greene  
Grindelia  
  aphanactis Rydb.  
  squarrosa (Pursh) Dunal  
Gutierrezia  
  glutinosa (Schauer.) SCH. Bip  
  microcephala (DC.) Gray  
  Sarothrae (Pursh) Britt. & Rusby  
Haplopappus  
  gracilis (Nutt.) Gray  
  pluriflorus (Gray) Hall  
  spinulosus (Pursh) DC.  
Helianthus  
  annuus L.  
  ciliaris DC.  
  pelicularis Nutt.  
  rigidus (Cass.) Desf.  
Helimeris  
  \* multiflora  
Heliopsis  
  scabra Dunal  
Heterosperma  
  \* pinnatum Ca.

Hymenoclea

monogyna Torr. & Gray

Hymenopappus

biennis B.L. Turner

filifolius Hook

\* flavescens

\* robustus

Hymenoxyx

\* aculis (Push) K.F.Parker

argentea (Gray) K.F. Parker

ororata DC/

richardsonii (Hook) Cockll.

Iva

\* ambrosiaefolia Gray

Kuhnia

chlorolepis Woot. & Standl.

Lactuca

pulchella (Pursh) DC.

serriola L.

Leucelene

ericioides (Torr.) Greene

Liatris

punctata Hook

Machaeranthera

\* aquifolius Greene

bigelovii (Gray) Greene

blephariphylla

cichorea

tanacetifolia (H.B.K.) Nees.

Malacothrix

fendleri Gray

Melampodium

leucanthrum Torr. & Gray

Palafoxia

\* linearis

Parthenium

incanum H.B.K.

Pectis

angustifolia Torr.

Perezia

nana Gray

Pericome

caudata Gray

Psilostrophe

sparsiflora (Gray) A. Nels.

tagetina (Nutt.) Greene

Ratibita

columnifera (Nutt.) Woot. & Standl. F.

tagetes (James) Barnh.

- Rudbeckia  
lacinata L.  
Sanvitalia  
alberti Gray  
Sartwellia  
\* mexicana  
Senecio  
\* ambrosioides  
\* bigelovii Gray  
longilobus Benth.  
\* monoensis  
multicapitatus Greene  
multilobatus Torr. & Gray  
\* neomexicana Gray  
wootonii Greene  
Solidago  
altissima L.  
\* canadensis L.  
missouriensis Nutt.  
\* nana  
\* rigida L.  
sparsiflora Gray  
\* wrightii Gray  
Sonchus  
asper (L.) Hill  
oleraceus L.  
Stephanomeria  
pauciflora (Torr.) A. Nels  
Taraxacum  
officinale L.  
Tetradymia  
\* filifolia Greene  
Thelesperma  
longipes Gray  
megapotamicum (Spreng.) Kuntze  
Townsendia  
\* eximia Gray  
exscapa (Richards) Porter  
\* formosa Greene  
\* incana  
\* strigosa+  
Tragopogon  
\* dubius Scop.  
\* porrifolius L.  
Vertesina  
encelioides (Cav.) Benth. & Hook  
Viguiera  
\* cordifolia Gray

*dentata* (Cav.) Spreng.  
\* *longifolia* (Robins & Greene) Blake  
*multiflora* (Nutt.) Blake  
Xanthium  
\* *saccharatum*  
*strumarium* L.  
Zinnia  
*grandiflora* Nutt.



Commonly Found Plants in Ladron Mountain Area

Scientific Name*	Common Name*
<u>Atriplex canescens</u> (Pursh) Nutt.	Fourwing saltbush
<u>Berberis haematocarpa</u> Wooten	Algerita
<u>Cercocarpus breviflorus</u> Gray	Mountain mahogany
<u>Chrypothamnus nauseosus</u> (Pall.) Britton	Rabbit-brush
<u>Ephedra trifurca</u> Torr.	Mormon tea
<u>Eurotia lanata</u> (Pursh) Moq.	Winter fat
<u>Fallugia paradoxa</u> (D.Don) Endl.	Apache plume
<u>Gutierrezia sarothrae</u> (Pursh) Britt and Rusby	Broom snakeweed
<u>Juniperus</u> spp.	Juniper
<u>Lycium pallidum</u> Miers.	Wolf-berry
<u>Nolina microcarpa</u> Wats.	Bear-grass
<u>Opuntia</u> spp.	Pricklypear cactus
<u>Pinus edulis</u> Engelm.	Pinon
<u>Pinus ponderosa</u> Lawson	Ponderosa pine
<u>Quercus</u> spp.	Oak
<u>Rhus</u> spp.	Sumac
<u>Yucca baccata</u> Torr.	Datil yucca, Spanish dagger
<u>Grasses Aristida longiseta</u> Steud.	Red three-awn
<u>Bouteloua curtipendula</u> (Michx.) Torr	Sideoats grama

\*Kearney, T. A. and R. H. Peebles. 1969. Arizona Flora. University of California Press. 1085 pp.

Scientific Name*	Common Name*
<u>Bouteloua gracilis</u> (H.B.K.) Lag.	Blue grama
<u>Hilaria Jamesii</u> (Torr.) Benth.	Galleta
<u>Koeleria cristata</u> (L.) Pers.	Junegrass
<u>Muhlenbergia torreyi</u> (Kunth.) Hitchc.	Ring muhly
<u>Sporobolus flexuosus</u> (Thurb.) Tydb.	Mesa dropseed
<u>Tridens pulchellus</u> (H.B.K.) Hitchc.	Fluff grass
<b>Forbs</b>	
<u>Bailey multiradiata</u> Harv. and Gray	Desert-marigold
<u>Cryptantha Jamesii</u> (Torr.) Payson	Nievitas
<u>Eriogonum</u> spp.	Wild-buckwheat
<u>Lepidium medium</u> Greene	Pepper-grass
<u>Lesquerella</u> spp.	Bladder-pod
<u>Lomatopsis longiflora</u>	Gilia
<u>Mentzelia pumila</u> (Nutt.) Torr. and Gray	Stick-leaf
<u>Mirabilis multiflora</u> (Torr.) Gray	Four-O'Clock
<u>Phacelea</u> spp.	Wild-heliotrope
<u>Polanisia trachysperma</u> Torr. and Gray	Clammy-weed
<u>Solanum elaeagnifolium</u> Cav.	Silver nightshade
<u>Sphaeralcea coccinea</u> (Pursh) Rydb.	Globe-mallow
<u>Sphaeralcea digitata</u> (Greene) Rydb.	Globe-mallow

CHECKLIST OF THE FAUNA OF LADRON MOUNTAIN\*

MAMMAL CHECKLIST	PG, 1-5
BIRD CHECKLIST	PG, 6-14
AMPHIBIAN CHECKLIST	PG, 15
REPTILE CHECKLIST	PG, 16-17

\* Revised from: Wagner Warren W., 1975, Biological Survey of Kirtland Air Force Base (East)



## MAMMAL CHECKLIST

### Order Chiroptera

1. Little Brown Myotis - Myotis lucifugus (Le Conte); Near permanent water; in this area only a transient.
2. Fringed Myotis - Myotis thysanodes Miller; Grassland to pinyon-juniper associations; occasional; generally near caves and old buildings.
3. Long-legged Myotis - Myotis volans (H. Allen); Grassland to mixed conifer associations; occasional.
4. Small-footed Myotis - Myotis leibii (Audubon & Bachman); Ponderosa pine associations; occasional in grassland associations.
5. Silver-haired Bat - Lasionycteris noctivagans (Le Conte); Habitat various; common; they roost under dead trees, in buildings and in fissures in rock ledges.
6. Big Brown Bat - Eptesicus fuscus (Palisot de Beauvois); Uncommon in Ponderosa pine association; occasionally in pinyon-juniper association.
7. Hoary Bat - Lasiurus cinereus (Palisot de Beauvois); Pinyon-juniper associations; common; found throughout state during migration.
8. Townsend's Big-eared Bat - Plecotus townsendii Cooper; Pinyon-juniper associations; rare; rock ledges and caves.
9. Pallid Bat - Antrozous pallidus (Le Conte); Grassland associations; summer resident; usually around rocky terrain and water, but are found occasionally without trees.
10. Brazilian Free-tailed Bat or Mexican Free-tailed Bat - Tadarida brasiliensis (I. Geoffroy Saint-Hilaire); Grassland to pinyon-juniper associations; occasional; most abundant from April-November.

### Order Lagomorpha

11. Desert Cottontail - Sylvilagus auduboni; Grassland to pinyon-juniper associations; common.

12. Black-tailed Jack Rabbit - Lepus californicus Gray; Grassland to pinyon-juniper associations; common.

Order Rodentia

13. Colorado Chipmunk - Eutamias quadriuittatus (Say); Pinyon-juniper associations; common if rock outcroppings are present.
14. Texas Antelope Squirrel - Ammospermophilus interpres (Merriam); Grassland to pinyon-juniper associations; common especially at mouths of canyons along arroyos.
15. Spotted Ground Squirrel - Spermophilus spilosoma Bennet; occasional in pinyon-juniper associations; common in sandy soiled areas.
16. Rock Squirrel - Spermophilus variegatus Erxleber; Grassland to pinyon-juniper associations; common in rocky canyons, slopes and arroyos.
17. Black-tailed Prairie Dog - Cynomys indovicianus (Ord); No longer found in this part of New Mexico due to poison campaigns.
18. Gunnison's Prairie Dog - Cynomys gunnisoni (Baird); Grassland association; occasional; also have been effected by control campaigns.
19. Botta's Pocket Gopher - Thomomys bottae (Eydoux & Gervais); Grassland to pinyon-juniper associations; common.
20. Silky Pocket Mouse - Perognathus flavus Baird; Grassland to pinyon-juniper associations; abundant.
21. Hispid Pocket Mouse - Perognathus hispidus Baird; Grassland associations; tall grass; possibly not in this area or rare; has been seen at foot of Sandia Mountains.
22. Rock Pocket Mouse - Perognathus intermedius Merriam; Grassland associations; common on rocky slopes.
23. Ord's Kangaroo Rat - Dipodomys ordii Woodhouse; Anywhere in or below the pinyon-juniper association; abundant when with D. merriami it occupies finer soils.
24. Banner-tailed Kangaroo Rat - Dipodomys spectabilis Merriam; Grassland associations; common; prefer heavier soils than Ord's kangaroo rat for their complex burrows.

25. Merriam's Kangaroo Rat - Dipodomys merriami Mears Rare; Grassland associations; occasional; the Sandia Mountains area is the northern most part of their range; they prefer coarse soils; see D. ordii.
26. Western Harvest Mouse - Reithrodontomys megalotis (Baird); Habitat various; common.
27. Deer Mouse - Peromyscus maniculatus (Wagner); Habitat various; Occasional; uncommon at higher elevation in this area.
28. White-footed mouse - Peromyscus leucopus (Rafinesque); Grassland associations; common; occupies soft earth and sandy soils along arroyos.
29. Brush Mouse - Peromyscus boylii (Baird); Grassland to lower elevations of pinyon-juniper associations; common in oak shrub areas.
30. Pinyon Mouse - Peromyscus truei (Schufeldt); Pinyon-juniper associations; common.
31. Rock Mouse - Peromyscus difficilis (J. A. Allen); Pinyon-juniper to upper portion of grassland associations; common.
32. Northern Grasshopper Mouse - Onychomys leucogaster (Wied-Neuvied); Grassland associations; common, especially on sandy soils.
33. Southern Plains Wood-rat - Neotoma micropus Baird; Grassland associations; occasional.
34. White-throated Wood-rat - Neotoma albigenula Hartley; Lower portions of pinyon-juniper associations; common; Neotoma micropus becomes less common and confined to grassland situation when sympatric with N. albigenula.
35. Mexican Vole - Microtus mexicanus (Saussure); Pinyon-juniper associations; occasional; descends to the pinyon-juniper at times of high population density in typical habitat of higher elevations.
36. House Mouse - Mus musculus Linnaeus; Grassland associations; common to disturbed areas such as roadsides.
37. Porcupine - Erethizon dorsatum (Linnaeus); Habitat various; occasional; denning in arroyo side burrows or rocky areas. Rare in this area.

Order Carnivora

38. Coyote - Canis latrans Say; Grassland to pinyon-juniper associations; oak-grassland; common.
39. Kit Fox - Vulpes macrotis; Grassland associations; occasional pinyon-juniper associations; found in areas of high rodent populations.
40. Gray Fox - Arocyon cinereoargenteus (Schreber); Pinyon-juniper associations; occasional.
41. Ringtail - Bassariscus astutus (Lichtenstein); Pinyon-juniper to grassland association; occasional; rocky cliffs and canyons.
42. Long-tailed Weasel - Mustela frenata Lichtenstein; Habitat various; rare; among rocks, brush piles, woods-edge where rodents are common.
43. Badger - Taxidea taxus (Schreber); Grassland associations; occasional in all habitats; presence may be related to presence and abundance of rodents.
44. Western Spotted Skunk - Spilogale gracilis (Linnaeus); Pinyon-juniper to grassland associations; rare or not at all in this area.
45. Striped Skunk - Mephitis mephitis (Schreber); Pinyon-juniper to grassland associations; common; seen around human constructions and along arroyos; especially susceptible to highway mortality.
46. Hog-nosed Skunk - Conepatus mesoleucus (Lichtenstein); Pinyon-juniper to grassland associations; rare; it is likely that this skunk is no longer to be found in the Ladron Mountains.
47. Mountain Lion - Felis concolor Linnaeus; a rare visitor; scarcity due to control campaigns and New Mexico is regarded as one of the Mountain Lions' last strongholds.
48. Bobcat - Lynx rufus (Schreber); Pinyon-juniper to upper portion of grassland associations; occasional; usually in rocky areas.

Order Artiodactyla

49. Mule deer - Odocoileus hemionus (Rafinesque); All but open grassland associations; occasional; populations are much lower than in the past.
50. Pronghorn - Antilocapra americana (Ord); Grassland associations; rare; a few occasionally on the southern and western ends of this area.



## BIRD CHECKLIST

### Order Falconiformes

1. Turkey Vulture - Cathartes aura (Linnaeus); Habitat various; common summer resident.
2. Goshawk - Accipiter gentilis (Linnaeus); Pinyon-juniper association; uncommon winter resident
3. Sharp-shinned Hawk - Accipiter striatus; Pinyon-juniper association; uncommon winter resident.
4. Cooper's Hawk - Accipiter cooperii (Bonaparte); Pinyon-juniper association; uncommon resident.
5. Red-tailed Hawk - Buteo jamaicensis (Gmelin); Habit various; uncommon resident.
6. Swainson's Hawk - Buteo swainsoni (Bonaparte); Grassland association; uncommon resident.
7. Ferruginous Hawk - Buteo regalis; Grassland association; rare resident.
8. Rough-legged Hawk - Buteo lagopus; Grassland association; rare winter resident.
9. Golden Eagle - Aquila chrysaetos (Linnaeus); Habitat various, usually near cliffs; uncommon resident.
10. Marsh Hawk - Circus cyaneus (Linnaeus); Grassland association; common transient.
11. Prairie Falcon - Falco mexicanus Schlegel; Grassland to pinyon-juniper associations, usually near cliffs; uncommon resident.
12. Peregrine Falcon - Falco peregrinus; Grassland-pinyon-juniper; rare endangered species. This area is within its possible range.
13. Sparrow Hawk - Falco sparverius; Grassland - lower pinyon-juniper; common resident.

14. Merlin - Falco columbarius Linnaeus; Upper pinyon-juniper association; rare transient and winter resident. Probably not in this area.
15. American Kestrel - Falco sparverius Linnaeus; Habitat various; common resident.

Order Galliformes

16. Scaled Quail - Callipepla squamata (Vigors); Upper grassland to pinyon-juniper associations; abundant resident.
17. Gambel's Quail - Lophortyx gambelii; Lower pinyon-juniper foothills; abundant resident.

Order Columbiformes

18. Band-tailed Pigeon - Columba fasciata Say; Pinyon-juniper association; uncommon resident.
19. Mourning Dove - Zenaida macroura (Linnaeus); Grassland association; common summer resident.

Order Cuculiformes

20. Roadrunner - Geococcyx californianus (Lesson); Grassland to pinyon-juniper associations; common resident.

Order Strigiformes

21. Barn Owl - Tyto alba (Bonaparte); Habitat various, usually near cliffs, banks, trees; rare resident.
22. Screech Owl - Otus asio (Ridgway); Pinyon-juniper association; uncommon resident.
23. Great Horned Owl - Bubo virginianus (Gmelin); Habitat various; common resident.
24. Pygmy Owl - Glaucidium gnoma; Upper pinyon-juniper association; uncommon resident.

25. Burrowing Owl - *Speotyto cunicularia* (Bonaparte); Grassland association; rare summer residents.
26. Long-eared Owl - *Asio otus*; Upper pinyon-juniper associations; rare resident.

Order Caprimulgiformes

27. Common Nighthawk - *Chordeiles minor* (Forster); Habitat various; common summer resident.
28. Poor-will - *Phalaenoptilus nuttallii* (Audubón); Upper grassland to pinyon-juniper associations; uncommon summer resident.

Order Apodiformes

29. White-throated Swift- *Aeronautes saxatalis* (Woodhouse); Pinyon-juniper association, usually in canyons; common summer resident.
30. Black-chinned Hummingbird - *Archilochus alexandri* (Bourcier and Mulsant); Pinyon-juniper association; common summer resident.
31. Broad-tailed Hummingbird - *Selasphorus platycercus* (Swainson); Pinyon-juniper association; common summer resident.
32. Rufous Hummingbird - *Selasphorus rufus* (Gmelin); Pinyon-juniper association; common late summer transient.
33. Calliope Hummingbird - *Stellula calliope* (Gould); Pinyon-juniper association; uncommon transient in summer.

Order Piciformes

34. Common Flicker - *Colaptes auratus*; Pinyon-juniper association; abundant resident.
35. Lewis' Woodpecker - *Asyndesmus lewisi* Riley; Pinyon-juniper association; rare transient.
36. Yellow-bellied Sapsucker - *Sphyrapicus varius* (Linnaeus); Pinyon-juniper association; common summer resident.

37. Williamson's Sapsucker - Sphyrapicus thyroides (Cassin); Pinyon-juniper association; rare transient.
38. Hairy Woodpecker - Dendrocopos villosus (Linnaeus); Pinyon-juniper association; uncommon resident.
39. Downy Woodpecker - Dendrocopos pubescens (Linnaeus); Pinyon-juniper association; common resident.
40. Ladder-backed Woodpecker - Dendrocopos scalaris (Wagler); Pinyon-juniper association; uncommon resident.

Order Passeriformes

41. Western Kingbird - Tyrannus verticalis Say; Grassland association; common summer resident.
42. Cassin's kingbird - Tyrannus vociferans Swainson; Pinyon-juniper association; uncommon summer resident.
43. Ash-throated Flycatcher - Myiarchus cinerascens (Lawrence); Pinyon-juniper association; common summer resident.
44. Say's Phoebe - Sayornis saya (Bonaparte); Grassland to pinyon-juniper associations; common summer resident.
45. Western Flycatcher - Empidonax difficilis Baird; Upper pinyon-juniper association, canyons; uncommon summer resident.
46. Western Wood Pewee - Contopus sordidulus Selater; Pinyon-juniper association; common summer resident.
47. Horned Lark - Eremophila alpestris (Linnaeus); Grassland association; abundant resident.
48. Violet-green Swallow - Tachycineta thalassina (Swainson); Upper pinyon-juniper association, canyons; common transient.
49. Barn Swallow - Hirundo rustica; Habitat various; common summer resident.
50. Rough-winged Swallow - Stelgidopteryx ruficollis; Habitat various, arroyos; uncommon summer resident.
51. Cliff Swallow - Petrochelidon pyrrhonota; Habitat various, often near cliffs; uncommon summer resident.

52. Steller's Jay - Cyanocitta stelleri (Gmelin); Upper pinyon-juniper association; uncommon winter resident.
53. Scrub Jay - Aphelocoma coerulescens (Bosc.); Pinyon-juniper association; common resident.
54. Common Raven - Corvus corax Linnaeus; Pinyon-juniper association; common resident.
55. Common Crow - Corvus brachyrhynchos Brehm.; Habitat various; common winter resident.
56. Pinyon Jay - Gymnorhinus cyanocephalus Wied.; Pinyon-juniper association; uncommon resident.
57. Clark's Nutcracker - Nucifraga columbiana (Wilson); Upper pinyon-juniper association; rare transient.
58. Mountain Chickadee - Parus gambeli Ridgway; Upper pinyon-juniper association; common resident.
59. Plain Titmouse - Parus inornatus Gambel; Pinyon-juniper association; common resident.
60. Common Bushtit - Psaltriparus minimus (Townsend); Pinyon-juniper association; common resident.
61. White-breasted Nuthatch - Sitta carolinensis Latham; Upper pinyon-juniper association; common resident.
62. Red-breasted Nuthatch - Sitta canadensis Linnaeus; Upper pinyon-juniper association; rare transient.
63. Pygmy Nuthatch - Sitta pygmaea Vigors; Upper pinyon-juniper association; rare resident.
64. Brown Creeper - Certhia familiaris Linnaeus; Upper pinyon-juniper association; rare transient.
65. House Wren - Troglodytes aedon Vieillot; Pinyon-juniper association; uncommon resident.
66. Bewick's Wren - Thryomanes bewickii (Audubon); Pinyon-juniper association; common resident.
67. Canyon Wren - Catherpes mexicanus (Swainson); Pinyon-juniper association, canyons; common resident.

68. Rock Wren - Salpinctes obsoletus (Say); Grassland to pinyon-juniper associations, canyons; common resident.
69. Mockingbird - Mimus polyglottos (Vigors); Grassland associations; common summer resident.
70. Crissal Thrasher - Toxostoma dorsale Henry; Pinyon-juniper association; uncommon resident.
71. Sage Thrasher - Oreoscoptes montanus (Townsend); Grassland to pinyon-juniper associations; uncommon winter resident.
72. American Robin - Turdus migratorius Linnaeus; Pinyon-juniper association; uncommon resident.
73. Hermit Thrush - Catharus guttatus (Pallas); Upper pinyon-juniper association; uncommon transient.
74. Western Bluebird - Sialia mexicanus Swainson; Grassland to pinyon-juniper associations; common resident.
75. Mountain Bluebird - Sialia currucoides (Bechstein); Grassland association; uncommon resident.
76. Townsend's Solitaire - Myadestes townsendi (Audubon); Pinyon-juniper association, canyons; common transient.
77. Blue-gray Gnatcatcher - Polioptila caerulea (Linnaeus); Pinyon-juniper association; common summer resident.
78. Ruby-crowned Kinglet - Regulus calendula (Linnaeus); Pinyon-juniper association; common transient.
79. Cedar Waxwing - Bombycilla cedrorum Vieillot; Upper pinyon-juniper association; rare transient in winter.
80. Bohemian Waxwing - Bombycilla garrulus (Linnaeus); Habitat various; rare transient in winter. Probably not in this area.
81. Loggerhead Shrike - Lanius ludovicianus Linnaeus; Grassland association; common resident.
82. Northern Shrike - Lanius excubitor; Grassland association; uncommon winter resident.
83. Starling - Sturnus vulgaris Linnaeus; Grassland to pinyon-juniper associations, near human habitation; abundant resident.

84. Solitary Vireo - Vireo solitarus (Wilson); Upper pinyon-juniper association; common summer resident.
85. Warbling Vireo - Vireo gilvus (Vieillot); Pinyon-juniper association; common transient.
86. Orange-crowned Warbler - Vermivora celata (Say); Pinyon-juniper association; uncommon transient.
87. Virginia's Warbler - Vermivora virginiae (Baird); Pinyon-juniper association; common summer resident.
88. Yellow-Warbler - Dendroica petechia (Linnaeus); Pinyon-juniper association, often near water; uncommon transient.
89. Yellow-rumped (Audubon's) Warbler - Dendroica coronata; Pinyon-juniper association; abundant transient.
90. Black-throated Gray Warbler - Dendroica nigrescens (J. K. Townsend); Pinyon-juniper association; uncommon summer resident.
91. Townsend's Warbler - Dendroica townsendi (Townsend); Pinyon-juniper association; uncommon transient.
92. MacGillivray's Warbler - Orporonis tolmiei (Townsend); Pinyon-juniper association; common transient.
93. Yellow-breasted Chat - Icteria virens (Linnaeus); Pinyon-juniper association, canyons; uncommon summer resident.
94. Wilson's Warbler - Wilsonia pusilla (Wilson); Upper grassland to pinyon-juniper associations; common transient.
95. House Sparrow - Passer domesticus (Linnaeus); Near human habitation; abundant resident.
96. Western Meadowlark - Sturnella neglecta Audubon; Grassland association; abundant resident.
97. Northern (Bullock's) Oriole - Icterus galbula; Upper pinyon-juniper association, often near water; rare summer resident.
98. Brown-headed Cowbird - Molothrus ater (Boddaert); Pinyon-juniper association; common summer resident.
99. Western Tanager - Piranga ludoviciana (Wilson); Pinyon-juniper association; common transient.

100. Hepatic Tanager - Piranga flava (Vieillot); Upper pinyon-juniper association; rare transient. Probably not in this area.
101. Black-headed Grosbeak - Pheucticus melanocephalus (Swainson); Upper pinyon-juniper association; uncommon summer resident.
102. Blue Grosbeak - Guiraca caerulea (Linnaeus); Grassland association, often near water; uncommon summer resident.
103. Indigo Bunting - Passerina cyanea (Linnaeus); Grassland association, often near water; rare summer resident.
104. Lazuli Bunting - Passerina amoena (Say); Grassland association, often near water; uncommon summer resident.
105. Evening Grosbeak - Hesperiphona vespertina (Cooper); Upper pinyon-juniper association; rare transient and winter resident.
106. Cassin's Finch - Carpodacus cassini Baird; Upper pinyon-juniper association; uncommon winter resident.
107. House Finch - Carpodacus mexicanus (Muller); Near human habitation, grassland to pinyon-juniper associations; abundant resident.
108. Lesser Goldfinch - Spinus psaltria (Say); Grassland association, often near water; common summer resident.
109. Red Crossbill - Loxia curvirostra Linnaeus; Pinyon-juniper association; rare transient.
110. Green-tailed Towhee - Chlorura chlorura (Audubon); Grassland to pinyon-juniper associations; uncommon transient and summer resident.
111. Rufous-sided Towhee - Pipilo erythropthalmus (Linnaeus); Pinyon-juniper association; common summer resident.
112. Brown Towhee - Pipilo fuscus Swainson; Pinyon-juniper association; rare summer resident.
113. Lark Bunting - Calamospiza melanocorys Stehnege; Grassland association; uncommon transient and winter resident.
114. Savannah Sparrow - Passerculus sandwichensis Grinnell; Grassland association; rare winter resident.

115. Vesper Sparrow - Pooecetes gramineus Baird; Grassland association, roadsides; uncommon transient.
116. Lark Sparrow - Chondestes grammacus (Say); Upper pinyon-juniper association; uncommon summer resident.
117. Rufous-crowned Sparrow - Aimophila ruficeps (Cassin); Grassland to pinyon-juniper associations; uncommon resident.
118. Black-throated Sparrow - Amphispiza bilineata Ridgway; Grassland association, usually near cholla stands; common summer resident.
119. Sage Sparrow - Amphispiza bellii (Cassin); Grassland association; rare transient.
120. Gray-headed Junco - Junco caniceps; Pinyon-juniper association; common winter resident.
121. Dark-eyed (Oregon) Junco - Junco hyemalis; Pinyon-juniper association; common winter resident.
122. Chipping Sparrow - Spizella passerina (Bechstein); Grassland to pinyon-juniper associations; abundant transient.
123. Brewer's Sparrow - Spizella breweri Cassin; Grassland to pinyon-juniper associations; uncommon transient.
124. Black-chinned Sparrow - Spizella atrogularis (Cabanis); Grassland to pinyon-juniper associations; uncommon summer resident.
125. White-crowned Sparrow - Zonotrichia leucophrys (J. R. Forster); Grassland association; common winter resident.
126. White-throated Sparrow - Zonotrichia albicollis (Gmelin); Pinyon-juniper association; rare transient and winter resident.
127. Fox Sparrow - Passerella iliaca (Merrem); Grassland association, often near water; rare transient.
128. Lincoln's Sparrow - Melospiza lincolni (Audubon); Grassland to pinyon-juniper associations; uncommon transient.
129. Song Sparrow - Melospiza melodia (Wilson); Grassland to pinyon-juniper associations; uncommon winter resident.
130. Chestnut-collared Longspur - Calcarius ornatus (J. K. Townsend); Grassland association; uncommon transient and winter resident.



## AMPHIBIAN CHECKLIST

1. Tiger Salamander - Ambystoma tigrinum Green; Temporary rain pools; probably not in this area.
2. Western Spadefoot - Scaphiopus hammondi Baird; Breeds in temporary rain pools in grassland areas.
3. Central Plains Spadefoot - Scaphiopus bombifrons Cope; Breeds in temporary rain pools in grassland areas; can be found together with Western spadefoot.
4. Great Plains Toad - Bufo cognatus Say; Breeds in temporary rain pools or intermittent stream in grassland.
5. Red-spotted Toad - Bufo punctatus Baird & Girard; Breeds in temporary pools or intermittent streams; open grassland; rocky canyons and arroyos.
6. Green Toad - Bufo debilis Girard; Breeds in temporary rain pools or intermittent streams.
7. Canyon Tree Frog - Hyla arenicolor Cope; Intermittent streams; found in rock lined pools in the upper portions of the pinyon-juniper association.



## REPTILE CHECKLIST

1. Western Box Turtle - Terrapene ornata Agassiz; Grassland associations; occasional; rain stimulates activity.
2. Lesser Earless Lizard - Holbrookia maculata Girard; Grassland association in arroyos and other sandy areas.
3. Collared Lizard - Crotaphytus collaris Say; Rocky areas in canyons and gullies; where vegetation is sparse.
4. Eastern Fence Lizard - Sceloporus undulatus Latreille; Habitat various.
5. Side-blotched Lizard - Uta stansburiana Baird & Girard; Grassland to pinyon-juniper; common along sandy and rocky arroyos.
6. Short-horned Lizard - Phrynosoma douglassi Bell; Grassland to pinyon-juniper association; occasional.
7. Texas Horned Lizard - Phrynosoma cornutum Harlan; Grassland to pinyon-juniper association.
8. Great Plains Skink - Eumeces obsoletus Baird & Girard; Grassland to pinyon-juniper association.
9. Many-lined Skink - Eumeces multivirgatus Hallowell; Habitat various; commonly found near human habitation, vacant lots and dumps.
10. Little Striped Whiptail - Cnemidophorus inornatus Baird; Grassland to pinyon-juniper associations with grass understory.
11. Plateau Whiptail - Cnemidophorus velox; Pinyon-juniper associations; probably not to be found in this area.
12. Chihuahua Whiptail - Cnemidophorus exsanquis; Grassland to pinyon-juniper associations; rocky slopes to sandy arroyos.
13. Checkered Whiptail - Cnemidophorus tesselatus; Habitat various; prefers rocky areas with sparse vegetation.
14. Western Hog-nosed Snake - Heterodon nasicus Baird & Girard; Grassland to pinyon-juniper associations; frequents arroyos and intermittent streams.

15. Striped Whipsnake - Masticophis taeniatus Hallowell; Pinyon-juniper to grassland associations; may be attracted to intermittent streams.
16. Coachwhip - Masticophis flagellum Shaw; Pinyon-juniper to grassland associations; more tolerant to dry environment than the striped whipsnake.
17. Mountain Patch-nosed Snake - Salvadora grahamiae Baird & Girard; Pinyon-juniper associations; occasionally found in grassland associations; prefers rocky canyons, plateaus and mountain slopes.
18. Bullsnake - Pituophis melanoleucus Daudin; Habitat various.
19. Common King Snake - Lampropeltis getulus splendida Baird & Girard; Habitat various; frequents rock outcrops and clumps of vegetation.
20. Painted Desert Glossy Snake - Arizona elegans philipi Klauber; Habitat various; prefers open areas with some rocks.
21. Texas Long-nosed Snake - Rhinocheilus lecontei tessellatus Garman; Grassland to shrub-grassland associations; nocturnal.
22. Black-necked Garter Snake - Thamnophis cyrtopsis Kennicott; Habitat various; frequents permanent and intermittent streams.
23. Western Terrestrial Garter Snake - Thamnophis elegans Baird & Girard; Grassland to pinyon-juniper associations; prefers damp areas.
24. Plains Black-headed Snake - Tantilla nigriceps Kennicott; Grassland to pinyon-juniper associations; prefers areas under rocks and other objects.
25. Texas Night Snake - Hypsiglena torquata texana Steineger; Grassland to pinyon-juniper associations; prefers rocky and sandy areas; nocturnal.
26. Western Diamondback Rattlesnake - Crotalus atrox Baird & Girard; Habitat various; usually nocturnal.
27. Prairie Rattlesnake - Crotalus viridis Rafinesque; Habitat various; prefers rocky outcrops, slides and rocky arroyos.
28. Black-tailed Rattlesnake - Crotalus molossus Baird & Girard; Habitat various; prefers rock slides, outcrops and rocky arroyos; possibly not found in this area.

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Scientific Name*	Common Name*
<u>Atriplex canescens</u> (Pursh) Nutt.	Fourwing saltbush
<u>Berberis haematocarpa</u> Wooten	Algerita
<u>Cercocarpus breviflorus</u> Gray	Mountain mahogany
<u>Chrypothamnus nauseosus</u> (Pall.) Britton	Rabbit-brush
<u>Ephedra trifurca</u> Torr.	Mormon tea
<u>Eurotia lanata</u> (Pursh) Moq.	Winter fat
<u>Fallugia paradoxa</u> (D. Don) Endl.	Apache plume
<u>Gutierrezia sarothrae</u> (Pursh) Britt and Rusby	Broom snakeweed
<u>Juniperus</u> spp.	Juniper
<u>Lycium pallidum</u> Miers.	Wolf-berry
<u>Nolina microcarpa</u> Wats.	Bear-grass
<u>Opuntia</u> spp.	Pricklypear cactus
<u>Pinus edulis</u> Engelm.	Pinon
<u>Pinus ponderosa</u> Lawson	Ponderosa pine
<u>Quercus</u> spp.	Oak
<u>Rhus</u> spp.	Sumac
<u>Yucca baccata</u> Torr.	Datil yucca, Spanish dagger
<u>Grasses Aristida longiseta</u> Steud.	Red three-awn
<u>Bouteloua curtipendula</u> (Michx.) Torr.	Sideoats grama

\*Kearney, T. A. and R. H. Peebles. 1969. Arizona Flora. University of California Press. 1085 pp.

Scientific Name	Common Name
<u>Bouteloua gracilis</u> (H.B.K.) Lag.	Blue grama
<u>Hilaria Jamesii</u> (Torr.) Benth.	Galleta
<u>Koeleria cristata</u> (L.) Pers.	Junegrass
<u>Muhlenbergia torreyi</u> (Kunth.) Hitchc.	Ring muhly
<u>Sporobolus flexuosus</u> (Thurb.) Tydb.	Mesa dropseed
<u>Tridens pulchellus</u> (H.B.K.) Hitchc.	Fluff grass
<u>Forbs</u>	
<u>Bailey multiradiata</u> Harv. and Gray	Desert-marigold
<u>Cryptantha Jamesii</u> (Torr.) Payson	Nievitas
<u>Eriogonum spp.</u>	Wild-buckwheat
<u>Lepidium medium</u> Greene	Pepper-grass
<u>Lesquerella spp.</u>	Bladder-pod
<u>Lptomopsis longiflora</u>	Gilia
<u>Mentzelia pumila</u> (Nutt.) Torr. and Gray	Stick-leaf
<u>Mirabilis multiflora</u> (Torr.) Gray	Four-O'Clock
<u>Phacelea spp.</u>	Wild-heliotrope
<u>Polanisia trachysperma</u> Torr. and Gray	Clammy-weed
<u>Solanum elaeagnifolium</u> Cav.	Silver nightshade
<u>Sphaeralcea coccinea</u> (Pursh) Rydb.	Globe-mallow
<u>Sphaeralcea digitata</u> (Greene) Rydb.	Globe-mallow

## SOILS OF LADRON MOUNTAIN

Descriptions of the three major soil association types occurring within the proposed primitive area, taken from; Soil Associations and Land Classification for Irrigation, Socorro County.\*

### 10. Harvey-Witt-Pinon association

This association includes a number of widely separated areas in both the eastern and northwestern parts of the county. Approximately 391,435 acres, or nine percent of the county, is included in this general soil area. It occurs mainly on gently to strongly sloping upland plains and valleys interspersed with moderately steep and rolling upland ridges and hills. There are also included a few steep escarpments or breaks and nearly level to gently sloping valley bottoms. The moderately steep and rolling uplands and breaks areas are more extensive in the eastern part of this association near Lincoln County. The soils range in depth from shallow on the upland ridges and low hills to moderately deep and deep on the less sloping areas.

The moderately steep and rolling upland ridges and low hills support moderate to heavy stands of pinyon and juniper trees which provide not only good habitat for wildlife but also fence posts and firewood. Although there are some thin and scattered stands of pinyon and juniper in the remaining areas of this unit, short and mid grasses are dominant. More common grasses include blue grama, western wheatgrass, Indian ricegrass, black grama, galleta, needle-and-thread grass, little bluestem, sideoats grama, and spike muhly.

\* Soil Associations and Land Classification for Irrigation, Socorro County. 1972, Agricultural Experiment Station Research Report 234, pages 24-26, 33-35, 42-43.

A few shrubs, including chamiza, rabbit-brush, winterfat, sagebrush, and cholla cactus, also occur in this association.

Soil Characteristics. The Harvey soils are mainly on the gently to strongly sloping valley side slopes. They typically have a moderately thick surface layer of light brown or grayish-brown, calcareous loam. The subsoil is similar, except that it contains more lime and is slightly lighter colored. This layer grades to pinkish-white, very limy loam at a depth of about 15 to 20 inches. The lime content decreases slightly below a depth of 30 to 36 inches.

Witt soils commonly occupy the broad gently sloping plains and valley slopes between the drainageways. They have a thin surface layer of light brown, non-calcareous loam over a thick subsoil of brown to reddishbrown clay loam that is noncalcareous in the upper part. A few threads and small soft masses of lime are common in the lower part of the subsoil. This is underlain by a pinkish-white, very limy loam at depths of 40 to 50 inches.

Pinon soils are located on the moderately steep and rolling ridges and low hills that occur throughout this association and are particularly extensive in the units in the eastern part of the county. They are characterized by their brown or grayish-brown, calcareous, channery loam surface layer. This grades through soil of similar texture that becomes lighter colored and more limy with depth. The light brown to pinkish-white, channery loam subsurface layer rests abruptly on partly weathered, fractured limestone bedrock at a depth of 10 to 20 inches.

Also in this association are soils of the Penistaja, La Fonda, Manzano, Rance, Pastura, Dean, and Poley series.

The Penistaja soils are similar to those of the Witt series but differ primarily in that they are coarser-textured and lack the strong lime layer. They typically have light brown, noncalcareous, fine sandy loam surface layers and sandy clay loam subsoils. The deep and gently to strongly sloping La Fonda soils commonly occur on the crests and side slopes of low ridges. They have a reddish-brown, calcareous, loam surface layer and a heavy loam subsoil. This is underlain by a light reddish-brown, strongly calcareous loam that usually contains many small soft masses and fine streaks of lime. The Manzano soils, which occur in swales and depressional areas adjacent to drainages, are deep, dark colored, and medium to moderately fine-textured. The Rance soils in this association commonly occur as a complex with Gypsum Land that consists of outcrops of typsiferous earth or rock. These soils, which have light brownish-gray, calcareous, loam surface layers and pale brown, loam or clay loam subsurface layers, are underlain by gypsiferous earth or rock at a depth ranging from about 15 to 35 inches. The Pastura and Dean soils, which are shallow, are underlain by caliche and soft caliche, respectively, within a depth of less than 20 inches. The moderately deep soils of the Poley series occur to a limited extent in the units in the western part of the county. These soils have a thin surface layer of reddish-brown, noncalcareous, gravelly loam over a reddish-brown, gravelly clay or clay loam subsoil. This is underlain by a soft to weakly cemented gravelly and cobbly caliche. In addition to these soils, approximately 10 percent of this association consists of miscellaneous land types including steep Rock Land, Gypsum Land, and Alluvial Land. Steep Rock Land occurs generally on mesa breaks, escarpments, or side slopes of ridges.

It consists of a complex of shallow soils and outcrops of bedrock with sandstone and limestone rock types being the most extensive. Gypsum Land differs in being less steep, and it consists of a complex of outcrops of gypsiferous earth or rocks and shallow soils. Alluvial Land occupies arroyo and drainage bottoms or flood plains and consists of very highly stratified soil materials with extremely variable textures.

#### 16. Chilton-Rough Broken Land association

Included in this association is an area of approximately 84,345 acres that roughly surrounds the Ladron Mountains in the north-central part of the county. It is dominated by highly dissected and moderately steep to rolling and hilly landscapes. It also contains small areas of alluvial fans, ridge tops, and valley bottoms that are gently to strongly sloping. The soils, which are generally gravelly and light-colored, range from shallow to deep. They are forming generally in old, coarse to medium-textured, gravelly alluvium. However, small areas of shallow soils are developing residually in materials weathered from underlying bedrock.

Although the density of the native vegetation is quite variable, the cover is generally fair to good and is dominated by short and mid grasses with a scattered and thin canopy of shrubs and juniper trees. The trees and shrubs are more prevalent on the breaks, escarpments, and the areas adjacent to the mountain uplands. Grasses which are more common include blue grama, black grama, sideoats grama, galleta, Texas timothy, Indian ricegrass, sand dropseed, threeawns, and ring muhly.

Soil Characteristics. Chilton soils occur on the gently to strongly sloping and rolling ridge crests and steep side slopes bordering drainageways.

These soils, which are deep, light-colored, and gravelly, are forming in old alluvial sediments of mixed origin. They have a surface layer of brown, noncalcareous to weakly calcareous, gravelly loam. This is underlain to a depth of 60 inches or more by a light brown, calcareous, very gravelly loam that usually contains some segregated lime in the form of small concretions and coatings on the coarse fragments or gravel. The content of gravel in the subsurface layers ranges from 35 to 85 percent, but is typically between 50 and 75 percent.

Rough Broken Land, a miscellaneous land type, is also relatively extensive in this association. It includes the moderately steep gravelly and moderately coarse to medium-textured sediments. Erosion is active in those areas not protected by a good cover of vegetation or a surface mantle of gravel. These lands are commonly dissected by numerous intermittent drainage channels, and runoff in this part of the association is generally rapid.

Other soils of lesser extent in this association include those of Lonti, Poley, La Fonda, and Leo series. The Lonti and Poley soils occur on the gently sloping to moderately steep areas near the base of mountain ranges and hills. The Lonti soils have brown, noncalcareous, gravelly sandy loam or gravelly loam surface layers and reddish-brown to brown, gravelly clay loam or gravelly clay subsoils. These are underlain by a substratum ranging in texture from a gravelly loam or sandy loam to a very gravelly loam and sandy loam containing many pinkish-white mottles and soft masses of lime. The Poley soils resemble the soils of the Lonti series but differ in being moderately deep over a strong lime zone. These soils have a thin surface of reddish-brown, noncalcareous, gravelly loam over a gravelly clay or gravelly clay loam subsoil. This is underlain by gravelly and cobbley soil layers containing large amounts of lime at depths of 20 to 36 inches.

The La Fonda soils, which are deep, well drained, and medium-textured, occupy the crests and side slopes of upland ridges and alluvial fans. They have a reddish-brown, calcareous, loam surface layer over a loam or a sandy clay loam subsoil and substratum. A weak but distinct lime zone in the form of fine soft masses and coatings on pebbles typically occurs at depths of 18 to 40 inches. Leo soils, which occur in the gently sloping valley bottoms and flood plains, have light brownish-gray, gravelly, sandy loam surface layers. These are underlain by stratified subsurface layers that average a gravelly loamy sand in texture. In addition to these soils, the association also includes small areas of unclassified alluvial soils, Rock Land, and Alluvial Land. The unclassified alluvial soils occupy gently sloping flood plains adjacent to intermittent drainages. They are deep and usually moderately coarse to medium-textured. Rock Land occurs on steep to very steep landscapes like the Rough Broken Land component of this association. It consists of a complex of shallow soils and outcrops of bedrock, instead of exposures of unconsolidated alluvium which characterize the Rough Broken Land. Alluvial Land includes the stratified and highly variable recent alluvial sediments in arroyo and drainage bottoms.

#### 20. Rock Land-Chimayo-Luzena association

This association includes the extensive areas of hilly to very steep mountain foothills and intermediate mountain areas in the western part of the county. It is widely distributed and comprises an area of approximately 502,740 acres, or about 12 percent of the county. Although there is a relatively wide range in altitude, most of this association ranges between 6000 and 7500 feet in elevation.

The topography is variable and ranges from gently to strongly sloping and rolling ridge tops to steep and extremely steep mountain side slopes. Small and narrow floors below the steep mountain side slopes and canyon walls are gently to strongly sloping.

The soils, which are generally stony or gravelly and shallow, are forming dominantly in materials weathered from a wide variety of igneous rocks. Rock outcrops and some rock slides are common on the steep side slopes below upland ridges. This is suitable for a number of uses, including recreation, livestock and wildlife grazing, and watershed. These steep hilly and mountain lands support a wide variety of native vegetation including pinyon pine, juniper, tree oaks, oakbrush, and mountain mahogany. There are also a few scattered ponderosa pines, particularly on the north slopes at the higher elevations. Some of the more common grasses are blue grama, sideoats grama, squirreltail, plains lovegrass, bullgrass, mountain muhly, little bluestem, dropseed spp., Arizona cotton-top, New Mexico feathergrass, and threeawns. The steep slopes, rock ledges, and escarpments tend to restrict grazing by livestock in parts of this association.

Soil Characteristics. Approximately 30 percent of this association has been included in a land type identified as Rock Land. It is characterized by numerous outcrops of bedrock and rock slides that usually occur on steep to very steep slopes. It consists of a complex of rock outcrops and shallow soils with variable characteristics. The shallow soils that are intermingled with rock outcrops, however, are generally gravelly or stony and moderately coarse-to-medium-textured. Stones and boulders occur on much of the soil surface. Although the soils are usually shallow, small areas of moderately deep soils occur interspersed with the shallow soils, rock outcrops, and rock ledges.

Rock slides included in this unit consist of an accumulation of rock fragments of various sizes and shapes.

Chimayo soils occur on steep mountain side slopes that range in gradient from about 30 to 75 percent. These soils typically have a thin surface layer of brown to grayish-brown, cobbly loam that is neutral in reaction. The subsurface layers are a light grayish-brown or light brown, very cobbly or very gravelly loam. This is underlain by igneous bedrock within a depth of 20 inches.

Luzena soils are shallow and moderately dark colored and are forming dominantly on acid igneous bedrock or conglomerate. They have a thin brown, noncalcarous, cobbly loam surface layer over a brown to dark reddish-brown, clay or gravelly clay subsoil. Igneous bedrock or conglomerate typically occurs within 20 inches of the surface.

Soils of the Faraway series are also relatively extensive in this association. They differ principally from the Luzena soils in lacking the clayey or fine-textured subsoil. Typically, the Faraway soils have a dark brown, neutral, very gravelly and cobbly loam surface layer. This grades through a brown, very cobbly or very gravelly loam to the underlying, fine-grained, igneous bedrock which is usually encountered within a depth of 20 inches.

Also in this association are soils of the Santana, Apache, Cabezon, Thunderbird, and Santa Fe series. The Santana soils, which are underlain by igneous bedrock within 20 inches of the surface, have a grayish-brown, neutral to slightly acid, stony surface layer and cobbly or stony loam subsurface layers. The Apache soils have a dark grayish-brown, calcareous, stony loam surface and grayish-brown, strongly calcareous, stony loam underlying layers. Basalt bedrock typically occurs at a depth of less than 20 inches.

The Cabezon soils have a surface layer of dark grayish-brown, noncalcareous, stony loam over a cobbly clay subsoil. This is underlain by basalt bedrock at depths ranging from 10 to 20 inches. The Thunderbird soils are like the Cabezon soils except they are 20 to 40 inches deep over basalt bedrock. The Santa Fe soils, which are also shallow, have dark brown, calcareous, gravelly loam or clay loam surface layers and dark reddish-brown, very gravelly clay loam subsoils.

Other soils and miscellaneous land types included in this association are unclassified deep alluvial soils, moderately deep and deep gravelly and stony soils, Rough Broken Land, and Alluvial Land. These inclusions, none of which is extensive, comprise less than five percent of the association.



## MINERAL DEVELOPMENT IN THE LADRON MOUNTAIN AREA

Very little evidence of important mineralization has been found in the Sierra Ladrones. Because of the decidedly rugged nature of the region, prospecting has not been carried on here as vigorously as elsewhere.

Copper has been found at two places, and unsuccessful attempts have been made to exploit each of the deposits. They are about 4 miles apart, and if they should continue along their strike would form a single zone trending westward. At one of these places, the Juan Torres prospect, fluorite is prominent, and a small amount of fluorspar is the only shipment made from the prospect. The copper mineralization, which the writer believes to be the more important economically, seems to have been ignored. Galena has been reported along the contact between the granite and limestone, but the writer was unable to find any indication of it.

### JUAN TORRES PROSPECT

The Juan Torres prospect is in Sec. 18, T. 2N., R. 2W., at the head of Mule Spring Arroyo south of Ladron Peak.

Figure 11 is a sketch of the north walls of a small trench which is the only working on the property. Johnston<sup>1</sup> describes the occurrence as follows:

The pre-Cambrian granite is cut by a 5-foot dike of fine-grained andesite. East of the dike and extending beyond the limits of the trench are two small horizontal veins which merge at the andesite and granite contact. The veins attain a maximum width of

2½ to 3 feet. Lining the veins and in contact with the granite walls is a band of quartz occurring in crystals up to 6 inches in length and showing well developed pyramid-terminated prisms. The fluorspar fills the space between the quartz on the walls of the vein.

The veins do not appear to extend far from the dike. Specularite and chalcocite occur with the quartz, and veinlets of specularite penetrate the fluorite. The chalcocite found in place occurs as small blebs and veinlets, but larger masses of oxidized material were observed on the dump. At the time of the writer's visit the trench was badly caved, but enough of the vein matter was exposed to permit the collection of a number of specimens which were carefully examined to determine, if possible, any significance of the specularite.

Chalcocite is the most important sulphide. It is the orthorhombic variety and shows a well-developed natural parting. Twinning can be seen under the microscope. A small quantity of covellite replaces chalcocite. Oxidation of the chalcocite still in place has been slight.

<sup>1</sup>Johnston, W. D., Fluorspar in New Mexico: N. Mex. Sch. of Mines, State Bur. of Mines and Min. Res. Bull. 4, pp. 124-125, 1928.

In a single specimen a very few microscopic residuals of bornite were found within chalcocite and at one place, associated with the bornite, a single speck of chalcopyrite. A minute microscopic fragment of specularite was also found enclosed in chalcocite, and although a number of small areas of specularite and magnetite (?) were seen, this was the only occurrence of ferric oxide that could be found in contact with a sulphide.

In one specimen examined under the microscope fluorite was seen in the same field with chalcocite and specularite.

From the not very abundant information that the writer was able to gather, the following order of deposition appears probable: Quartz, fluorite, specularite, bornite, chalcocite, covellite and carbonates. The bornite is probably a replacement of some other mineral which has been completely consumed, presumably chalcopyrite.

#### RULE PROSPECT

The Rule prospect is in T. 2N., R. 2 W., in the Sevilleta (La Joya) Grant at a place that would correspond approximately to Sec. 14. The fault contact between the pre-Cambrian and the Tertiary-Quaternary deposits to the eastward is irregular, and in the vicinity of the Rule prospect a small area of loosely cemented arkose of the Santa Fe formation extends northwestward into the granite. A basaltic dike separates the granite and the arkose on the northeast side of this area and shows slickensided contacts. The dike rock and the arkose are widely permeated by copper carbonates and a very minor amount of silicate in fractures which extend in many directions. Copper carbonates form part of the cementing material in some of the arkose. Mineralization has penetrated slightly into the granite, and both the mineralized granite and the dike rock contain, in addition to the oxidized minerals, disseminated microscopic particles of pyrite, chalcocite and covellite.

Numerous shallow shafts have been dug, and an unsuccessful attempt has been made to work the deposit. There are a small jaw crusher, a pump, two concrete tanks, and a pile of iron scrap about half a mile from the workings. It is reported that the milling process consisted of leaching and precipitation of the copper on iron scrap.

#### POSSIBILITIES

So far as the writer knows, only two metalliferous deposits have been found in the entire Sierra Ladrones district. At each of these copper is the chief metal, and neither constitutes obviously workable deposit. The amount of work done at two places is negligible and the areas open to observation are very small, and for these reasons no concrete statement about the general possibilities of the district can be made.

Specifically, the relations observed at the Juan Torres prospect hazily suggest prospecting at higher elevations in the range. The presence of the ferric oxides as apparently early vein minerals which have been only slightly attacked, if at all, by sulphide-carrying solutions, suggests that the present horizon is near the bottom of the sulphide zone and that there will be a gradual impoverishment of the sulphides with depth, that is, nearer the source of the solutions.<sup>1</sup> Conversely, more abundant sulphides may be expected farther from the source.

The Juan Torres prospect is at a relatively low elevation in the deeply-eroded pre-Cambrian rocks, and it is therefore possible that prospecting at somewhat higher elevations may disclose workable sulphide ore bodies. The deposit has been opened to such a slight extent that it would be advisable to prospect the occurrence more fully before definitely concluding that little sulphide lies below the present working.

At the Rule prospect it is probable that the presence of the sulphides was not known, since they occur in microscopic particles. Possibly all assays were accepted as indicating copper carbonate. Some cheap treatment designed to extract the sulphides as well as the carbonates might prove successful. It appears unlikely that richer ore may be found at this place.



This intern report was read and accepted by a staff member at:

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This report was completed by a WICHE intern. This intern's project was part of the Resources Development Internship Program administered by the Western Interstate Commission for Higher Education (WICHE).

The purpose of the internship program is to bring organizations involved in community and economic development, environmental problems and the humanities together with institutions of higher education and their students in the West for the benefit of all.

For these organizations, the intern program provides the problem-solving talents of student manpower while making the resources of universities and colleges more available. For institutions of higher education, the program provides relevant field education for their students while building their capacity for problem-solving.

WICHE is an organization in the West uniquely suited for sponsoring such a program. It is an interstate agency formed by the thirteen western states for the specific purpose of relating the resources of higher education to the needs of western citizens. WICHE has been concerned with a broad range of community needs in the West for some time, insofar as they bear directly on the well-being of western peoples and the future of higher education in the West. WICHE feels that the internship program is one method for meeting its obligations within the thirteen western states. In its efforts to achieve these objectives, WICHE appreciates having received the generous support and assistance of the Economic Development Administration; the Jessie Smith Noyes Foundation; the National Endowment for the Humanities; the Wyoming Office of Manpower Planning; and of innumerable local leaders and community organizations, including the agency that sponsored this intern project.

For further information, write Bob Hullinghorst, Director, Resources Development Internship Program, WICHE, P.O. Drawer 'P', Boulder, Colorado 80302 or call (303) 492-7177.

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